Preliminary Assessment Sampling and Analysis Plan

Crawford Street Site Portland, Oregon

Prepared for

Crawford Street Corporation

August 11, 2000

BRIDGEWATER GROUP, INC.

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ROSS D. RIEKE, P.E.
4640 SW MACADAM; SUITE 222
PORTLAND, OR 97201
TEL: (503) 973-6068
FAX: (503) 973-6069
rrieke@bridgeh2o.com

August 10, 2000

CRF001

Mr. Tom Gainer
Oregon Department of Environmental Quality
2020 SW Fourth Ave., Suite 400
Portland, OR 97201-4987

Subject: Crawford Street Corporation Site
Preliminary Assessment Sampling and Analysis Plan

Dear Mr. Gainer:

Please find enclosed three copies of the August 11, 2000 *Preliminary Assessment Sampling and Analysis Plan, Crawford Street Corporation Site*. This revised sampling and analysis plan is submitted in response to your July 24, 2000 letter to Mat Cusma at Schnitzer Steel Industries regarding the revised Preliminary Assessment dated June 14, 2000.

Please call if you have any questions.

Sincerely,

BRIDGEWATER GROUP, INC.

Ross D. Rieke, P.E.
Vice President
Environmental Consultant

Encl.

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SECTION 1

INTRODUCTION

This Preliminary Assessment (PA) Sampling and Analysis Plan (SAP) describes the sampling and analysis that will be performed as part of the PA performed for the Crawford Street Corporation (CSC) site in Portland, Oregon (Figure 1-1 and Figure 1-2).

This SAP is revised from the SAP presented in the June 14, 2000, *Preliminary Assessment, Crawford Street Site, Portland, Oregon* report. The revisions are based on the SAP proposed in the June 14, 2000 PA report, DEQ's July 24, 2000 comments on the proposed sampling program, and recent property ownership determinations.

SECTION 2

SAMPLING AND ANALYSIS OF SOURCE/PATHWAYS OF CONCERN

This section presents the sampling and analysis program that will be performed at the CSC site as part of the PA. The purpose of the sampling and analysis is to assess whether releases of Contaminants of Interest (COIs) have occurred from potential source(s) and whether released COIs have migrated through the identified potential pathways to the Willamette River or otherwise could pose a potential threat to human health and the environment.

Potential source(s) that require further assessment and their associated COIs are discussed in Section 5 of the June 14, 2000 PA report. These features of concern and associated COIs are:

Storm Water Runoff From Columbia Forge Yard – PAHs, VOCs, and metals

Import Black Sand in southwest portion of South Area – PAHs, lead, mercury

The sampling and analysis program was developed to assess whether releases have occurred from these possible sources and whether these releases may pose a potential threat to human health and the environment.

2.1 Storm Water Runoff From Columbia Forge Yard

The sampling and analysis program for the Columbia Forge operation yard storm water runoff was developed based on the specific routes through which a possible release from the yard could pose a threat to human health or the environment. The basis for the potential exposure pathways are discussed in Section 4 of the June 14, 2000 PA report.

2.1.1 Worker Contact with Surface Soil

A surface soil sample will be collected from the unpaved portion of the Columbia Forge yard (i.e. the low area near the southwest corner) to assess whether there has been a release to the surface soil that could pose a threat to workers through direct contact (ingestion or dermal exposure routes) or through inhalation. This area is where soil staining was observed during the site reconnaissance and is also the topographical low point where surface water runoff from other areas of the Columbia Forge operations yard accumulates.

A surface soil sample will be collected from the upper 6-inches of soil in this area and analyzed for the Columbia Forge COIs (PAHs, metals, and VOCs). The specific laboratory analyses that will be performed are presented in Section 5.1 below.

Figure 2-1 shows the surface soil sample location (SS-1). Other possible areas where direct contact with surface soil with possible COIs due to the Columbia Forge yard runoff (i.e. at former drain outlets along UPRR spur) will be sampled as described in Section 2.1.2 below.

2.1.2 Migration Through Surface Water Drainage to Willamette River Receptors

The potential for COIs to have been released from the Columbia Forge yard and to have migrated to the Willamette River via the surface water pathway will be assessed by collecting two surface soil samples. The soil samples will be collected from where storm water runoff from the Columbia Forge operations yard previously drained from collection pipes to the ground surface near the UPRR rail spur. As noted in the June 14, 2000 PA report, equipment operations in the Columbia Forge operations yard may have resulted in incidental drips of oils and associated oily runoff. The proposed sampling locations SS-2 and SS-3 are located where possible oily water runoff from the Columbia Forge operations yard could possibly have been released to the surface soil and migrated with local surface water. Figure 2-1 shows the proposed soil sampling locations.

Because sample SS-3 is on City of Portland property, collecting sample SS-3 will require obtaining access from the City of Portland.

The June 14, 2000 PA report proposed several additional surface soil samples beyond those proposed above. The purpose of those samples was to assess potential run-on to the UPRR alignment, which tends to accumulate and channel runoff, from up gradient sources such as the UPRR alignment east of the CSC site and the industrial properties north of the CSC site.

Subsequent to the June 14, 2000 report, it was discovered that the property along the UPRR rail spur is owned by the City of Portland, not CSC as presumed in the June 14, 2000 PA report. Given this property ownership, most of the proposed sample locations are no longer relevant or appropriate for assessing the runoff from the CSC site (i.e. Columbia Forge yard). For this reason, previously proposed samples SS-2, SS-3, SS-4, and SS-7 are no longer included in the PA sampling program.

Surface soil contamination is expected to be the most indicative of a possible release to the soil from surface water runoff. Therefore, the soil samples will be collected from the upper 6-inches of the ground surface at the proposed locations shown in Figure 2-1. The soil samples will be analyzed for the Columbia Forge COIs (PAHs, metals, and VOCs). The specific laboratory analyses that will be performed are presented in Section 5.1 below.

2.1.3 Migration Through Groundwater to Willamette River Receptors

As described in Section 4.1.2 of the June 14, 2000 PA report, the sole possible exposure pathway associated with impacted groundwater at the CSC site is through discharge of the shallow groundwater to the Willamette River bordering the southern edge of the CSC site. Any groundwater impacts resulting from possible releases in the Columbia Forge yard would pose a threat only by migrating and discharging to the river.

A contingent groundwater sampling and analysis program will be performed in the event that the results of the surface soil sampling performed to assess the direct worker contact pathway (Section 2.1.1) and the surface water migration pathway (Section 2.1.2) indicate possible groundwater impacts. Section 2.3 describes the contingent groundwater assessment program.

Whether or not the surface soil analysis results are indicative of possible groundwater impacts will be determined by comparing the measured concentrations of COIs in the surface soil samples against specific criteria. In particular, the criteria against which the surface soil COI concentrations will be compared are as follows:

- If the COI concentration does not exceed the concentrations deemed protective of groundwater in the DEQ Oregon Soil Cleanup Table (i.e. concentrations noted with an "a" in the Pathway column), no potential groundwater impacts will be assumed to exist for that COI.
- If the COI is not listed in the DEQ table or is listed under a non-groundwater pathway (e.g. direct contact), the measured surface soil concentration will be compared to the "Migration to Groundwater" criteria listed in Table A-1 of EPA's May 1996, Soil Screening Guidance: Technical Background Document. If the measured surface soil concentration does not exceed the EPA Soil Screening value, it will be assumed that there are no potential groundwater impacts.

If the COI concentrations in the surface soil samples exceed the criteria described above, the potential for contaminated groundwater to migrate to the Willamette River will be assessed using the program described in Section 2.3. Only those COIs that exceed the surface soil concentration criteria will be included in the groundwater assessment.

2.2 Import Black Sand

2.2.1 Worker Direct Contact with Soil

One soil sample will be collected from where the black sand is exposed at the ground surface along the top of the bank in the South Area of the CSC site. This soil sample will be collected to assess whether the black sand represents a release to the soil that could pose a threat to workers

through direct contact (ingestion or dermal exposure routes) or through inhalation.

The soil sample will be collected by excavating a shallow (about 3 feet deep) test pit in the area where the most heavily stained soil is observed at the ground surface. The 3-foot depth is based on the maximum reported thickness of the black sand in the 1988 Emcon study. The soil sample will be collected from the most visibly stained soil horizon exposed in the test pit. Figure 2-1 shows the approximate location of the proposed test pit soil sample (TP-1). The sample will be analyzed for PAHs, lead, mercury, cadmium, chromium, and PCBs. The specific laboratory analyses that will be performed are presented in Section 5.2 below.

2.2.2 Leaching to Willamette River Receptors

One surface soil sample will be collected from where the black sand is exposed on the shoreline in direct contact with the Willamette River. This surface soil sample will be collected to assess whether the black sand represents a release to the surface soil that could pose a threat through leaching to the river.

The surface soil sample will be collected from the most heavily stained area exposed at the shoreline. Figure 2-1 shows the approximate location of the proposed surface soil sample (SS-4). The sample will be analyzed for PAHs, lead, mercury, cadmium, chromium, and PCBs. The specific laboratory analyses that will be performed are presented in Section 5.2 below.

2.2.3 Migration Through Groundwater to Willamette River Receptors

As described in Section 4.1.2 of the June 14, 2000 PA report, the sole possible exposure pathway associated with impacted groundwater at the CSC site is through discharge of the shallow groundwater to the Willamette River bordering the southern edge of the CSC site. Any groundwater impacts resulting from possible releases from the black sand would pose a threat only by migrating and discharging to the river. This is especially true considering the close proximity of the black sand to the river.

A contingent groundwater sampling and analysis program will be performed in the event that the results of the surface soil sampling performed to assess the direct worker contact pathway (Section 2.2.1) and the surface water migration pathway (Section 2.2.2) indicate possible groundwater impacts. Section 2.3 describes the contingent groundwater assessment program.

Whether or not the soil analysis results are indicative of possible groundwater impacts will be determined by comparing the measured concentrations of COIs in the soil samples against specific criteria. In particular, the criteria against which the soil COI concentrations will be compared are as follows:

- If the COI concentration does not exceed the concentrations deemed protective of groundwater in the DEQ Oregon Soil Cleanup Table (i.e. concentrations noted with an "a" in the Pathway column), no potential groundwater impacts will be assumed to exist for that COI.
- If the COI is not listed in the DEQ table or is listed under a non-groundwater pathway (e.g. direct contact), the measured soil concentration will be compared to the "Migration to Groundwater" criteria listed in Table A-1 of EPA's May 1996, *Soil Screening Guidance: Technical Background Document*. If the measured soil concentration does not exceed the EPA Soil Screening value, it will be assumed that there are no potential groundwater impacts.

If the COI concentrations in the soil samples exceed the criteria described above, the potential for contaminated groundwater to migrate to the Willamette River will be assessed using the program described in Section 2.3. Only those COIs that exceed the soil concentration criteria will be included in the groundwater assessment.

2.3 Contingent Groundwater Migration Pathway Assessment

The potential for COIs present in the Columbia Forge yard or the black sand to have impacted the shallow groundwater, and for the groundwater to have migrated to the Willamette River, will be assessed only if the COIs are detected in the surface and near-surface soil samples at concentrations exceeding the criteria presented in Sections 2.1.3 and 2.2.3.

The "contingent" groundwater assessment would consist of collecting a groundwater sample at the down gradient edge of the CSC site, directly down gradient from both the black sand area and the Columbia Forge yard. The location of the contingent groundwater sample is shown on Figure 2-1.

The groundwater sample will be collected by drilling and installing a groundwater monitoring well. A groundwater monitoring well will be used rather than probe sampling techniques due to the low solubility/high soil-water partition coefficients of the COIs (PAHs and metals). It is doubtful that a sufficiently non-turbid groundwater sample could be collected from a probe exploration given the lack of a properly installed well screen and developed filter pack possible only with an installed well. Because of the affinity that PAHs and metals have for soil particles, analysis of a turbid sample would measure the COIs on the suspended soil particles rather than the dissolved constituents in the groundwater.

The groundwater sample will be analyzed for only the COIs exceeding the surface soil criteria (See Sections 2.1.3 and 2.2.3).

If the groundwater assessment indicates a possible impact to the river through discharge of contaminated groundwater, further groundwater

sampling and analysis between the black sand and the Columbia Forge yard will be necessary to assess the source of the groundwater impacts and associated possible threat. Sampling and analysis from up gradient of the Columbia Forge yard will also likely be necessary to assess background water quality and potential offsite sources.

SECTION 3

DATA QUALITY OBJECTIVES

The data collected during the sampling and analysis program will be used to assess whether any releases have occurred from the suspect sources and whether these releases, if any, pose a potential threat to human health or the environment. This assessment will be performed by comparing the results of the sampling and analysis to conservative screening levels. In particular, the measured concentrations of hazardous substances in the soil samples, if any, will be compared to the following:

- EPA Region IX Preliminary Remediation Goals for industrial sites
- DEQ Risk Based Concentration values for direct worker contact, inhalation, and protection of groundwater pathways.
- DEQ Soil Cleanup Table concentrations
- EPA Soil Screening Concentrations for protection of groundwater

The measured concentrations of hazardous substances in the groundwater, if any, will be compared to ambient water quality criteria given the anticipated beneficial shallow groundwater use as discharge to the Willamette River.

The quality of the field and laboratory data will be sufficient to meet this end use of the data. In particular, the analytical laboratory detection limits will be lower than the screening criteria where possible with typical analytical techniques. The field sampling procedures will be performed to provide representative samples.

SECTION 4

SAMPLING PROCEDURES

This section presents the procedures that will be used to collect the samples described in Section 2.

4.1 Surface Soil Samples

Each surface soil sample collected for non-VOC analysis will consist of five subsamples composited into a single sample. The subsamples will be collected in a 5-point dice pattern across an approximately 5-foot by 5-foot area at each sample location.

The purpose of the composite sampling at each location is to obtain a concentration that is representative of how the soil in the area of the sample would impact a possible receptor or migration pathway (e.g. direct contact to a worker or impact on a surface water pathway). A single point concentration is not representative of how the soil contamination in the sample area would affect a possible receptor. Given the small subarea from which each subsample is collected (about 5 square feet), single point concentrations at each subsample location are not representative or useful.

Each sample will be collected using the following procedure:

- Scrape away surface vegetation, if present, at each subsample location.
- Excavate a minimum 6-inch deep hole with a clean shovel at each subsample location. If necessary, a clean pick will be used to penetrate the surface.
- After the hole is excavated, collect the soil sample across the upper 6-inches of the sidewall of the hole with a clean trowel or spoon. Exclude large gravel or organic debris from the sample.
- Place the subsample in the laboratory-supplied glass container. Fill the container about 1/5 with each subsample. Instruct the analytical laboratory to thoroughly mix the sample before collecting the aliquot for analysis.
- Place the filled sample container in a chilled cooler for transport to the analytical laboratory.

Samples collected for VOC analyses will consist of a point sample collected from any stained areas within the composite area. If stained soil is not present in the composite area, the VOC sample will be collected from the center point of the 5-point dice pattern.

The samples will be collected and transported using proper chain-of-custody procedures. The samples will be transported to the analytical laboratory within 24 hours of collection. Field notes will be maintained noting the general soil conditions and any unusual or unanticipated conditions.

4.2 Subsurface Soil Samples

Subsurface soil samples will be collected from shallow (about 3 feet deep) test pits excavated either by hand (with a clean shovel) or with a small backhoe excavator. The soil sample will be collected from the sidewall of the test pit using a clean metal spoon or trowel. If the pit is excavated with a backhoe and the pit is unsafe to enter to obtain the sample, the sample will be collected from the bucket of the excavator.

The soil sample will be placed in a laboratory-supplied glass container and placed in a chilled cooler. The sample will be transported to the analytical laboratory within 24 hours of collection.

Once the soil sample is collected, the test pit will be backfilled with the previously removed soil. Field notes will be maintained noting the general soil conditions and any unusual or unanticipated conditions.

4.3 Contingent Groundwater Monitoring Well Installation and Sampling

The groundwater sample will be collected from a drilled and constructed groundwater monitoring well. The methods and procedures that will be used to drill and construct the well and to collect the groundwater sample from the well are described below.

4.3.1 Soil Boring

The groundwater monitoring well boring will be drilled using a truck- or trailer-mounted, hollow-stem auger drill rig. The soil boring will be drilled to the estimated depth of the monitoring well, which will be subsequently constructed. The completion depth is anticipated to be about 40 feet, corresponding to about 10 feet below the top of the shallow groundwater table.

Continuous soil samples will be collected by driving a 5-foot long, nominal 2-inch diameter core barrel sampler using combination of mechanical hammer blows and pushing. The sampling technician will remove the soil core from the sampler for field screening, description, and placement into sample jars. Soil samples will be transferred from the core into labeled, laboratory-supplied sample jars using a clean stainless steel spoon. Any extra soil generated during drilling activities will be managed as investigation derived waste (IDW).

Headspace measurements will be made on all soil samples and all soil samples will be observed for field evidence (odor or sheen) of contamination.

The field technician will observe and document the drilling activities including preparing a detailed field log for the boring. The field geologist will describe the soil samples, noting any indications of contamination, and will describe the lithologic characteristics using the Unified Soil Classification System (USCS). Other features such as sorting, sedimentary features, mineralogy, degree of weathering, and contacts with other soil types will also be noted if relevant. In particular, the depth of the black sand encountered in the boring will be logged.

4.3.2 Monitoring Well Construction and Development

The groundwater monitoring well will be constructed in the soil borings described in Section 4.3.1 in accordance with OAR 690-240 and DEQ guidance, *Groundwater Monitoring Well Drilling, Construction, and Decommissioning* (1992). A start card will be filed by the driller in accordance with OAR 690-240.

The well will be completed using 2-inch diameter, flush-threaded Schedule 40 PVC casing. The screened interval of the well will be 10 feet long and consist of 20-slot machine slotted PVC screen with a PVC end cap threaded to the bottom of the screen. The screened section will be placed below the solid casing near the bottom of the wellbore. The top of the casing will be capped with a lockable, water-tight cap.

A clean silica sand pack will be placed between the boring wall and the PVC screen/riser (i.e., the annulus) from the bottom of the well to approximately one to two feet above the screened interval. A bentonite seal will be placed above the sand to about one to two feet of the ground surface.

The surface completion will consist of a locking, steel stick-up monument protected with bollards. The monument will be permanently marked with well identification numbers.

The field geologist will document the well construction activities in field notes and a well construction log. Details to be noted include:

- Length of well components.
- Measurements of bentonite, sand, and concrete depths.
- Types, brands, and amounts of materials used.
- Documentation of decontamination.
- Any deviation from standard procedures or problems encountered during the well installation activities.

The drilling contractor will be responsible for conforming to all applicable regulations pertaining to well construction.

The groundwater monitoring well will be developed after construction to minimize the turbidity of the groundwater samples collected for analysis and to optimize the hydraulic efficiency of the well. The well will be developed by surging with a slug rod and purging at least three casing volumes of water from the well using a stainless steel bailer or two-stage pump.

During development, electrical conductivity, temperature, dissolved oxygen, and pH will be measured for each casing volume removed from the well to assess the effectiveness of the development. Development is considered complete when no additional reduction in the turbidity of the well water is observed and after the above parameters have stabilized to within 10 percent for three successive casing volumes. Development water will be managed as IDW.

4.3.3 Groundwater Sampling

Groundwater Level Measurements

The groundwater level in the monitoring well will be measured prior to collecting the groundwater sample. The groundwater level will be measured to the reference point marked on the well casing and recorded for the purpose of determining groundwater elevations. The well will be opened and the water level allowed to equilibrate before the measurement is taken. The groundwater level will be measured to the nearest 0.01 foot using an electronic probe.

Purging

After the groundwater level is measured, the well will be purged using a low flow electric pump. The volume of water evacuated from the well will be measured in five-gallon buckets, and the temperature, pH and specific conductivity of the purged water will be measured at five-gallon intervals. Purging will be considered complete when each measured parameter has stabilized (i.e., three consecutive measurements are within ±10%). In the event that the well is pumped or bailed dry prior to achieving stable field measurements, purging will be considered complete and the volume removed will be recorded. Purge water will be managed as IDW.

Collecting Groundwater Sample

A groundwater sample will be obtained from the well immediately after purging using a low flow electric pump. If the well purges dry, the well will be allowed to recover to at least 50 percent of its original volume before collecting the sample. The groundwater sample will be placed directly into laboratory-supplied containers. The container will be placed directly into a chilled cooler for transport to the analytical laboratory. The sample will be collected and transported using proper chain-of-custody procedures.

4.4 Field QA/QC Procedures

One field duplicate surface soil sample will be collected to assess the representativeness of the surface soil field sampling technique. If VOC analysis is performed on groundwater samples, a trip blank will be prepared by the laboratory and included with the field-collected groundwater sample. The trip blank will be analyzed for VOCs to assess for possible background contamination incurred during handling and transport of the groundwater sample.

SECTION 5

ANALYTICAL LABORATORY ANALYSIS

This section presents the laboratory analysis methods that will be used to analyze the soil and groundwater samples collected. Laboratory analysis will be performed by North Creek Analytical laboratory in Beaverton, Oregon using EPA methods and QA/QC procedures.

5.1 Columbia Forge Yard Surface Soil Samples

Each surface soil sample collected to assess the Columbia Forge yard will be analyzed for the Columbia Forge COIs using the following methods:

- PAHs by EPA Method 8310 or 8270 SIM
- Total Priority Pollutant Metals by EPA 3000 series/6000 series
- TCLP Priority Pollutant Metals by EPA Method 1311/6000 series
- Mercury by EPA Method 7471
- TCLP Mercury by EPA Method 1311/7471
- VOCs by EPA Method 8261

The TCLP analysis results will be used in the assessment of whether there are potential groundwater impacts (the DEQ Soil Cleanup Table is based on TCLP concentrations for metals).

5.2 Import Black Sand Surface Soil Samples

Each soil sample collected to assess the black sand will be analyzed for the black sand COIs using the following methods:

- PAHs by EPA Method 8310 or 8270 SIM
- Total Lead by EPA Method 3000 series/6010
- TCLP Lead by EPA Method 1311/6010
- Total Mercury by EPA Method 7471
- TCLP Mercury by EPA Method 1311/7471
- Total Cadmium by EPA Method 3000 series/6010
- TCLP Cadmium by EPA Method 1311/6010
- Total Chromium by EPA Method 3000 series/6010

- TCLP Chromium by EPA Method 1311/6010
- PCBs by EPA Method 8082

The TCLP analysis results will be used in the assessment of whether there are potential groundwater impacts (the DEQ Soil Cleanup Table is based on TCLP concentrations for metals).

5.3 Contingent Groundwater Sample

The specific analysis methods for the groundwater sample collected from the contingent monitoring well will be determined based on the results of the surface soil analyses. In general, the groundwater sample will be analyzed for only those COIs that exceed the screening criteria presented in 2.1.3 or 2.2.3.

5.4 Laboratory QA/QC Procedures

Standard analytical laboratory procedures will be used including method blanks, surrogate spikes, blank spikes, and blank spike duplicates. A QA/QC review of the laboratory data will be performed once the data is received from the analytical laboratory. This review will include the following:

- Chain-of-custody complete and correct
- Analysis within holding times
- Chemicals of interest in method blanks
- Blank spike recoveries within accuracy control limits
- Blank spike duplicate results within analytical precision control limits
- Surrogate recoveries within accuracy control limits
- Matrix spike recoveries within accuracy control limits
- Matrix spike duplicate results within analytical precision control limits
- Detection limits sufficiently low

On the basis of the results of the QA/QC data review, the data will be flagged according to standard EPA procedures. Questionable data will be flagged with a "J" and considered an estimated value. Data unacceptable for its intended use will be rejected and flagged with an "R."

SECTION 6

REPORTING

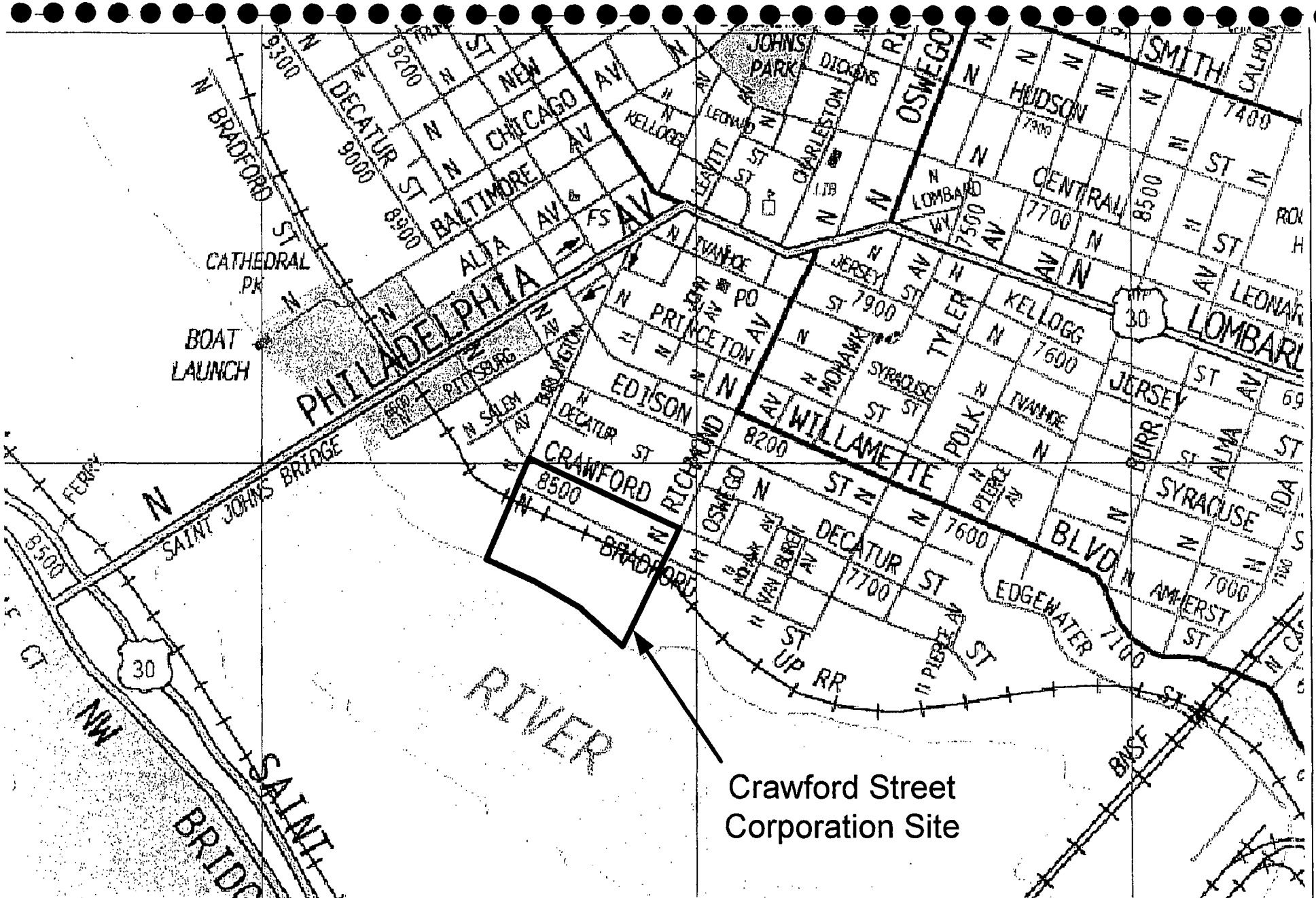
The results of the PA sampling will be presented in a report once the results of the chemical analysis are received from the laboratory. The report will include the following:

- Table showing the results of the chemical analysis.
- Figure showing the location of the surface soil samples and groundwater monitoring well, if installed.
- Description of the soil and general site conditions in the area where the samples were collected.
- Soil boring logs and well construction diagrams for the groundwater monitoring well installation, if installed.
- Discussion of any unanticipated or unusual conditions encountered while collecting the soil samples.
- Relevant photographs taken during the sampling activities
- Copy of the analytical laboratory report.

The report will also include a brief assessment of the potential for releases and migration of hazardous substances based on the results of the PA sampling.

Once the results of the soil sample analysis are received from the laboratory, the data will be reviewed and compared to the criteria presented in Section 2.1.3 and 2.2.3. If the criteria are exceeded, a brief memorandum will be prepared and provided to DEQ describing the COIs for which the criteria were exceeded and the resulting COIs that will be considered in the groundwater assessment. The groundwater assessment will then be performed.

If the PA sampling indicates that no additional assessment of the CSC site is necessary after installation and sampling of the contingent groundwater monitoring well, the groundwater monitoring well will be abandoned. The well will be abandoned in accordance with DEQ guidance and the Oregon Water Resource Department rules.



Portland, Oregon

Approximate Scale

770 feet

Figure 1-1
Site Location Map
Crawford Street Corporation Site

BRIDGEWATER GROUP, INC.

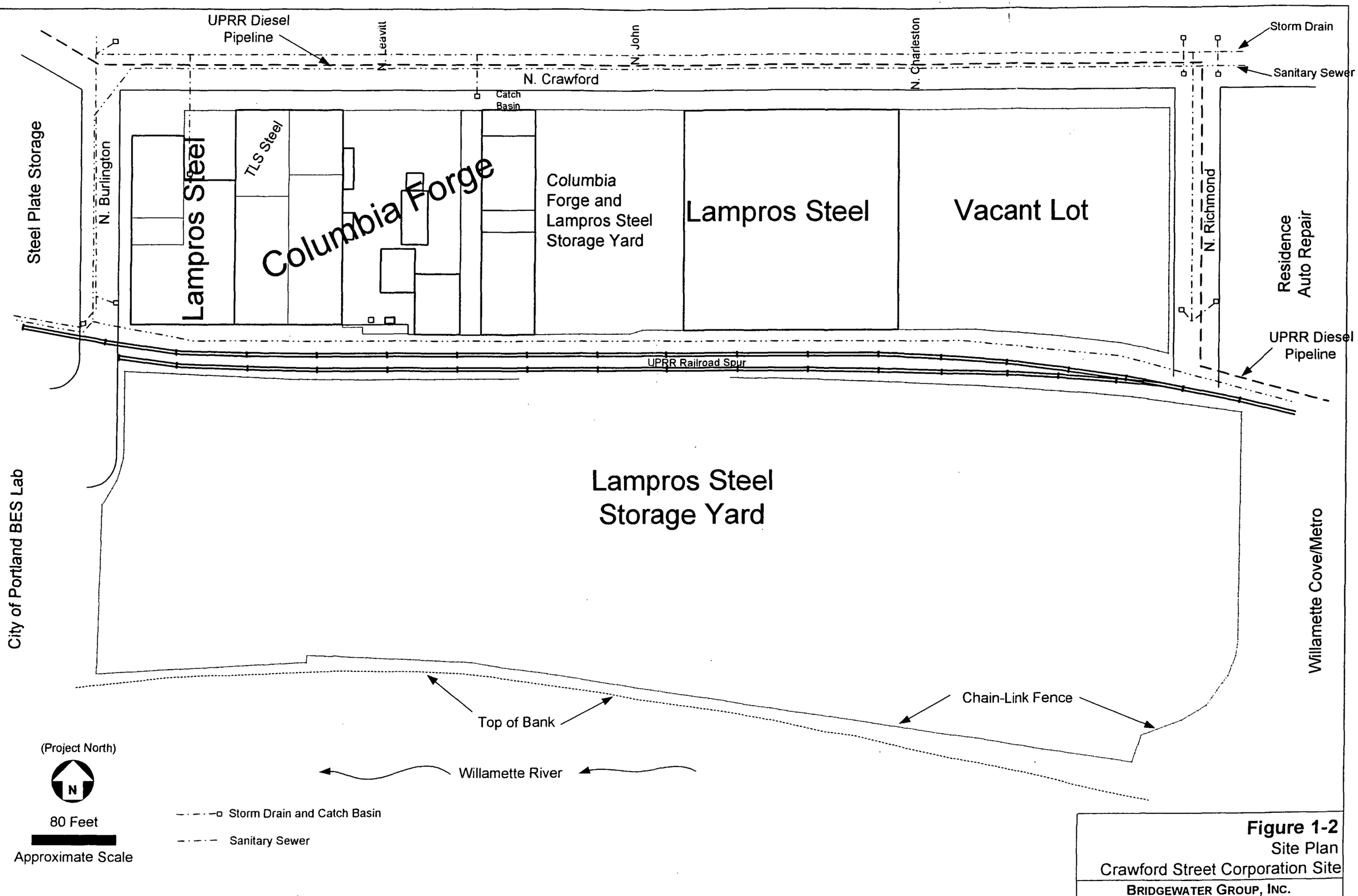


Figure 1-2
Site Plan
Crawford Street Corporation Site
BRIDGEWATER GROUP, INC.

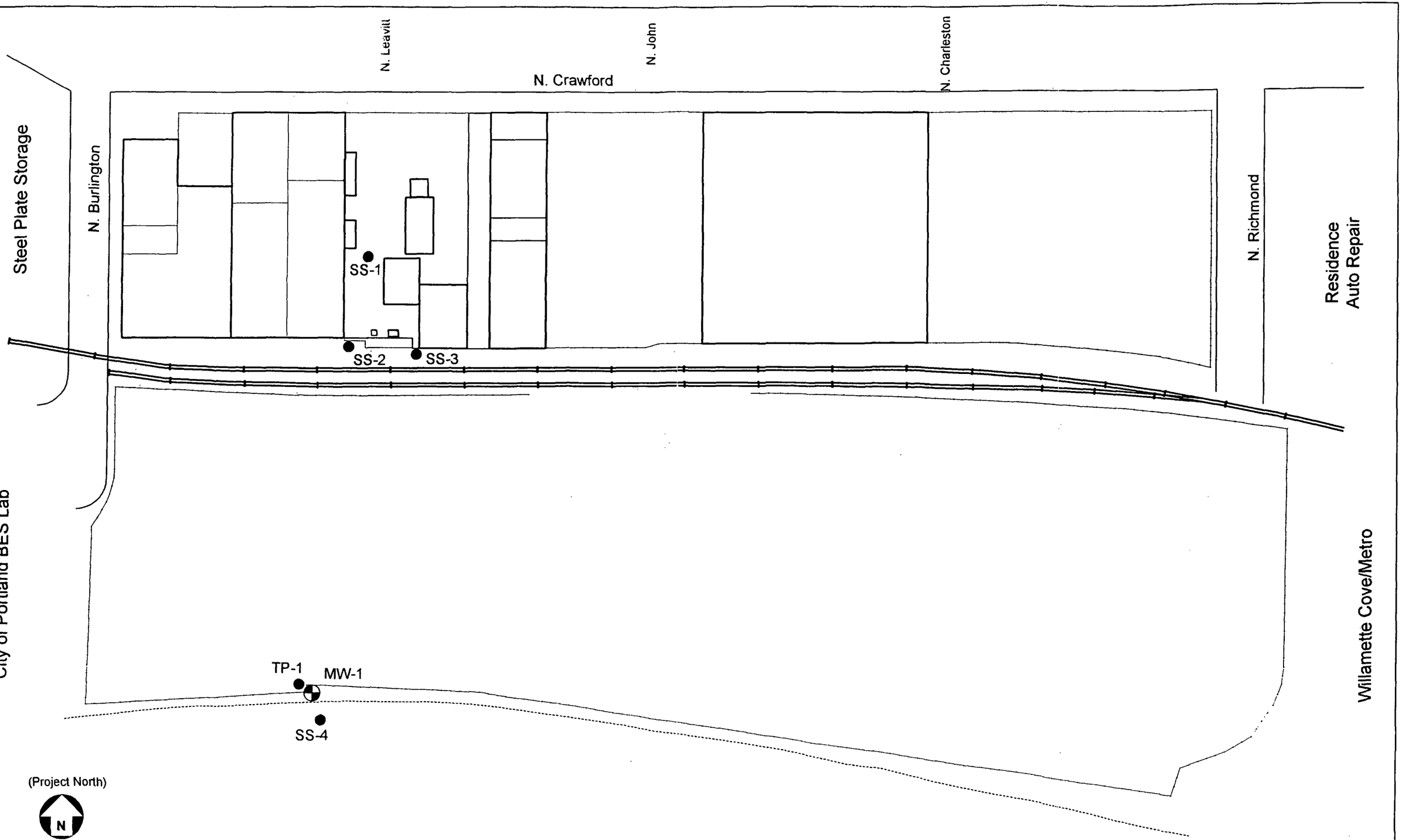


Figure 2-1
Proposed PA Sampling Locations
Crawford Street Corporation Site
BRIDGEWATER GROUP, INC.

Preliminary Assessment

Crawford Street Site
Portland, Oregon

Prepared for

Crawford Street Corporation

February 10, 2000

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SECTION 1

INTRODUCTION

This Preliminary Assessment (PA) report presents the results of a PA performed for the Crawford Street Corporation (CSC) site in Portland, Oregon (Figure 1-1). The site includes current addresses of 8424 and 8524 North Crawford Street. This PA was requested by the Oregon Department of Environmental Quality (DEQ) and is being performed under a DEQ Voluntary Cleanup Letter Agreement dated November 8, 1999.

1.1 Purpose of the Preliminary Assessment

The purpose of the PA is to assess the potential for releases of hazardous substances to have occurred at the CSC site and for the releases, if they have occurred, to have migrated to the Willamette River sediments and caused a threat to human health or the environment. Based on the October 1, 1999 DEQ Site Strategy Recommendation for the CSC site, the contaminants of interest (COIs) in the Willamette River sediments adjacent to the CSC site are:

- Arsenic
- Lead
- Mercury
- Di-n-butylphthalate
- Low molecular weight polynuclear aromatic hydrocarbons (LPAHs)
- High molecular weight polynuclear aromatic hydrocarbons (HPAHs)
- Organotins

The PA specifically assesses the potential for these COIs to have been released on the CSC site during CSC's ownership of the site and to have migrated to the Willamette River.

This PA also identifies a soil sampling program to further assess whether COIs may have been released from the CSC site and may have migrated to the Willamette River.

1.2 Scope of Preliminary Assessment

The PA was performed by reviewing available historical information, performing a site reconnaissance, and interviewing available persons familiar with the current and past site operations. Specific sources of information reviewed included:

- Sanborn Fire Insurance maps from 1905, 1911, 1924, 1950, and 1969.
- Aerial photographs from the U.S. Army Corps of Engineering and Northern Lights Studio from 1936, 1939, 1940, 1948, 1955, 1956, 1957, 1961, 1963, 1964, 1967, 1968, 1970, 1971, 1972, 1973, 1977, 1980, 1984, 1991, 1994, 1996, and 1998.
- City Directories for 1936, 1941, 1950, 1955, 1960, 1970, 1975, 1980, 1985, 1990, and 1998.
- Historical photographs from the Oregon Historical Society for the late 1800s, early 1900s, and 1932.

A site reconnaissance was performed on December 9 and 21, 1999. Representatives of CSC and the current property tenants were interviewed during the site visits.

SECTION 2

CURRENT SITE CONDITIONS AND OPERATIONS

The CSC site is an approximately 15-acre site located along the Willamette River in the St. Johns district of Portland, Oregon (Figure 2-1). The site is situated in the southwest quarter of Section 15, Township 1 South, Range 1 West. The site is bordered by the Willamette River to the south, North Burlington and North Richmond Streets to the west and east, respectively, and by North Crawford Street to the north. A Union Pacific Railroad (UPRR) rail spur runs east/west through the center of the site.

For the purposes of the PA and consistent with the past and current use of the site, the site is separated into two areas; North Area and the South Area. The North Area is located north of the railroad tracks and the South Area is located south of the railroad tracks. The North Area is currently mostly covered with buildings and pavement while the south area is vacant and covered with gravel and asphalt pavement.

The overall site area slopes down, relatively steeply north of the CSC site, from north to south with a slight slope down from east to west. A USGS Map showing the regional topography is presented in Figure 2-2. A 1998 aerial photograph is presented in Figure 2-3. Appendix A presents representative photographs of the current site conditions.

2.1 Local Utilities and Storm Water System

The site is currently served by the public utility system including water and sewer. Water lines are located in beneath Crawford Street and the UPRR rail spur. Electric power is provided from along Crawford Street. A buried, 8-inch diameter UPRR diesel pipeline is located beneath North Crawford Street west of the site and between North Burlington and Richmond Streets. The pipeline alignment then follows North Richmond Street between North Crawford Street and the UPRR rail spur. East of the site, the pipeline lies beneath the UPRR rail spur.

Storm water runoff in the CSC site area is collected in local catch basins and conveyed in the City of Portland storm sewer system. The collected storm water is conveyed to the Willamette River through the outfall located on the City of Portland property west (downriver) of the CSC site (City Outfall 50). From its construction in the early 1900s to about 1997, sewage from the overall St. Johns area was occasionally also conveyed through Outfall 50 during periods of wet weather. In approximately 1997, the sanitary sewer in the CSC site area was separated from the storm water system and sewage "overflows" are no longer discharged through the outfall.

Storm drain lines at the CSC site are located along the UPRR rail spur and along North Crawford Street. Catch basins along Crawford Street drain into the Crawford Street lines. Roof drains from the CSC buildings are connected to the line along the UPRR tracks. Two catch basins are located just north of the intersection of the UPRR tracks and North Burlington Street. These catch basins capture most of the runoff from both the CSC site and the large area up-slope (i.e. north) of the site. The buried storm drain lines flow east to west.

2.2 North Area

For the purposes of describing the current site conditions and consistent with current site use, the north area is subdivided into five subareas:

- North Richmond Street to North Charleston Street (Vacated)
- North Charleston Street (Vacated) to North John Street (Vacated)
- Columbia Forge
- TLS Steel
- Lampros Steel

The current site conditions on each of these areas are presented below.

2.2.1 North Richmond Street to North Charleston Street

This area is vacant and covered mostly with dense vegetation. This area slopes down from the northeast to the southwest. A portion of the interior of the area has been cleared and gravel fill has been placed. Lampros Steel is using the gravel-filled area for limited storage of structural steel product.

The entire area is fenced with a gate in the southeast corner of the area. No significant areas of stains or distressed vegetation were observed in this area. In summary, no evidence of releases of hazardous substances was observed in this area of the CSC site.

2.2.2 North Charleston Street to North John Street

This entire area is covered by a 200-foot by 200-foot steel building. The building is open to the west and is used by Lampros Steel to cut structural steel beams. The building has a sound concrete floor and no floor drains were observed. Lampros uses small quantities of lubricating oil in the beam saw located in this building. Lampros uses water-based cutting lubricants in the beam saw. The lubricating oil and water-based cutting oils were stored in the various locations in the building, near the cutting equipment. Oil staining was observed on the building floor beneath the cutting equipment. The oil was contained on the floor and no evidence of release to the underlying soil was observed. Lampros representatives

noted that they have always used water-based lubricants since they started operations at the site in 1989.

In summary, no evidence of releases of hazardous substances was observed in this area of the CSC site.

2.2.3 Columbia Forge

The Columbia Forge area includes a 10,000 square-foot steel building on the eastern edge of the area (Building 1) and a 20,000 square-foot concrete masonry and wood-frame building on the western edge of the area (Building 2/3). The buildings border an approximately 26,000 square-foot yard that includes covered upset forges, shear, drop forge, and induction heater areas and an oil storage shed. These buildings are shown in Figure 2-4.

Two forges set on concrete pads are located in the southern end of Building 1. The perimeter of this area is covered with a concrete floor with the area between the forge pads and the perimeter being bare ground. The floor and ground surface in this area is covered with mill scale which is oxidized metal that falls from the surface of the steel after it has been heated and is being shaped. The mill scale is a valuable product and is routinely collected from the floor and reprocessed. The forges are fueled by natural gas. The forges are cooled with water that is circulated through a water cooling-tower outside the southeast corner of the building.

The northern portion of Building 1 is used for machining and contains several large lathes. This area has a sound concrete floor with no floor drains. Water-based cutting oils were observed in this area and the CSC representatives noted that the facility had been using water-based oil since the late 1970s. Prior to that time, petroleum-based cutting oils were used. No evidence of releases was observed in the machining room.

The far northern end of Building 1 is used for offices.

Columbia Forge Building 2/3 is used primarily for storage of various metal equipment, parts, and steel stock. Steel cutting is performed in the southeastern corner of this building. Oil stains are present on the building floor. This building has a sound concrete floor and no floor drains. Two small part washers are located in this building as shown on Figure 2-4. Petroleum-based naphtha solvents have been used since Columbia Forge started operations. Chlorinated solvents have never been used at the Columbia Forge facility. Columbia Forge is a conditionally exempt hazardous waste generator due solely to the waste naphtha solvents (i.e. D001) generated in the Safety Kleen part washers.

Small quantities of oil and lubricant products were observed in this area including lubricant oil for the air compressor located just east of the building and aerosol cans of brake cleaner in the northwest portion of the building. No evidence of releases of these products was observed in these areas.

The Columbia Forge yard is an approximately 26,000 square-foot area between Building 1 and Building 2/3. The yard is paved except for the far

southwest corner. Upsetter forges and induction heaters are located in covered areas along the eastern edge of the yard. A large drop forge is located in a covered area in the southern portion of the yard. Welding operations are performed in a covered area in the southeastern portion of the yard. All forging and general operation areas are covered. Steel materials to be forged are stored throughout the yard including steel rod and pipe.

An approximately 1,000 square-foot oil storage building is located in the central portion of the yard. Lubricating oil used in the equipment on the Columbia Forge site is stored in this building. Other materials stored in this building include used oil, and two drums of Safety-Kleen naphtha solvent. Approximately forty 55-gallon drums, mostly lubricating oils, were stored in the oil storage building. The drums were placed in metal containment trays and spill kits were conspicuously located in the northeast corner building. The floor of the building was sound concrete with no floor drains. Although there was evidence of incidental drippage of oil (i.e. stains) on the building floor, rapid cleanup of the incidental drippage with absorbent material appears to have prevented any migration of the minor spills. The facility manager did not recall any spills of oil that caused impacts outside the building.

Used oil is removed from the site by a licensed oil recycler for recycling.

Two storm water drainage catch basins are located in the yard. One catch basin is located near the northeast corner of the drop forge. One catch basin is located along the western edge of the yard just north of the compressor building. Storm water runoff from the yard flows to these catch basins. From the catch basins, the water flows through buried pipes to the south boundary of the yard where the water infiltrates into the ground alongside the UPRR rail spur. CSC has installed filters within the catch basins to remove suspended particulates from the storm water runoff.

Most of the roof drains from the Columbia Forge and Lampros buildings are connected to the storm drain line located along the UPRR rail spur.

2.2.4 TLS Steel

TLS Steel leases a small (less than 2,000 square-feet) space from Columbia Forge in the northern end of Building 2/3. TLS performs light metal heating, shaping, punching, cutting, and bending using a small natural gas-fired furnace. TLS has been operating in the current location since 1989. The portion of Building 2/3 that TLS occupies is a wood frame building with a metal roof.

TLS uses small amounts of lubricating oil and cutting oil. All cutting oils are water-based. Lubricating and cutting oils are stored in various containers throughout the relatively small TLS area. Although petroleum stains are present on the TLS floor, the floor was sound concrete with no floor drains. No evidence of recent releases of hazardous substances was observed in the TLS area.

2.2.5 Lampros Steel

Lampros Steel has been operating on the CSC site since 1989. Lampros Steel distributes steel structural members (typically steel W and H sections). As part of the distribution work, Lampros also cuts and bends members to customer specifications. All cutting and bending work is performed in the building located west of the Columbia Forge area (See Section 2.2.2).

Activities performed in the Lampros area in the northwest corner of the CSC site include general storage of equipment and raw materials (steel bars and beams). Hazardous substances observed in the Lampros building included hydraulic oil (three 55-gallon drums), water-based cutting oil (two 55-gallon drums), and used oil (one 55-gallon drum). No significant stains were observed on the sound concrete floor. No floor drains were observed. The Lampros Steel office is located in the northwest corner of the Lampros building.

A 1,000-gallon, above ground diesel storage tank is located at the northern edge of the Lampros site. A steel containment box surrounds the tank. No stains were observed on the pavement surrounding the containment box. The Lampros representative was not aware of any releases or spills from the tank.

Lampros Steel is not a registered hazardous waste generator and evidence of hazardous waste generation was not observed. Used oil generated through equipment maintenance is placed in the Columbia Forge oil storage building and recycled offsite by a licensed oil recycler.

In summary, no evidence of recent releases of hazardous substances was observed in this area of the CSC site.

2.2.6 UPRR Rail Spur

Soil staining typical of rail road operations was observed along the UPRR rail spur separating the North and South Areas. The staining was consistent with petroleum hydrocarbons releases from diesel locomotives and spillage of products from the rail road cars.

2.3 South Area

The South Area of the CSC site consists of about 7 acres of open area used by Lampros Steel to store and stage structural steel beams. Most of the northern half of the area is paved with asphalt. Most of the southern half is covered with gravel. Lampros Steel representatives estimated that about 60 percent of the overall South Area is paved. No buildings are present in this area and the structural steel is stored in rows with access paths for the fork lifts and trucks in between the rows.

The entire South Area is fenced with access gates in the western and eastern ends of the area. The fence has been knocked over for an approximate 100-foot length along the southern edge of the property near

the abandoned extension of North John Street and for an approximate 50-foot length along the eastern boundary near the UPRR rail spur.

The riverbank is vegetated with blackberries and small trees. Most of the bank is covered with concrete debris and logs. Some of the concrete debris is larger than 6 feet with logs greater than 20 feet long. Smaller asphalt debris was also observed on the riverbank. Although the vegetation limited the ability to closely observe, no seeps were observed along the riverbank during the site reconnaissance. A nominal 8-inch diameter concrete pipe was observed protruding from the river bank about 200 feet east of the western boundary of the site. No evidence of recent flow from the pipe was observed (even after recent wet weather) and the pipe appeared to be associated with previous uses of the site.

In general, surface water was observed to infiltrate into the bare ground in the South Area and no evidence of direct surface water runoff to the adjacent Willamette River was observed. However, there were limited areas along the riverbank where small draws and associated surface water collection areas along the top of the bank were observed. Although these areas do not appear to drain large areas of the South Area, localized runoff collection and flow to the adjacent river could occur in these areas during heavy rainfall events.

Limited areas of black sand were observed along the top of the bank and, in some areas, along the river shoreline. The black sand appears to be different from the native soil present along the riverbank. The black sand was present in some of the small draw areas observed along the riverbank. The black sand is believed to have been imported and placed by previous property owners during the demolition of the former lumber mill buildings.

In summary, no evidence of recent releases of hazardous substances was observed in this area of the CSC site.

2.4 Adjacent North of Crawford Street Corporation Property

The area north of the CSC site is used for heavy equipment and truck storage and repair. St. Johns Truck and Equipment/Hildebrand Truck & Equipment is located immediately north (up gradient) of the CSC site, across North Crawford Street at 8435 North Crawford Street. The central portion of the site is used to store a large amount of disassembled truck parts including transmissions, wheels, tires, tanks, rear-end assemblies, and axles on unpaved ground. The property was observed from public right-of-ways during the site reconnaissance.

A heavily-stained, uncovered wash pit is present immediately adjacent to North Crawford Street, across the street from the Columbia Forge office. The approximate 15-foot by 30-foot area drains to a sump that presumably drains to the local storm water or sanitary sewer system. The concrete floor in the wash pit was heavily stained with petroleum

hydrocarbons. What appeared to be a solvent cleaning tank was also located in the wash pit. Any releases from the solvent tank would also flow directly to the drain.

Based on hazardous substance reports filed with the State Fire Marshal, St. Johns Truck and Equipment handles significant quantities of hazardous substances including waste oil, motor fuel, fuel oil, and welding gasses. St. Johns Truck and Equipment is also noted as having a sodium hydroxide cleaning tank.

The western portion of this up gradient property (across from Lampros Steel offices) is also used to store trucks. Oil stains are present on the unpaved ground where the trucks are stored. Torch cutting of disassembled truck parts is also being performed in this area.

St. Johns Marine is located north of the CSC site, along North Richmond Street. Along with boat and boat motor repair facilities, boats and boat motors are stored outside on unpaved ground.

Storm water runoff from these up gradient areas flows on to, and across the CSC site. In particular, runoff flows off of the St. Johns Truck and Equipment site and flows on to the Lampros Steel property at the west end of the CSC site, onto the Columbia Forge yard, and onto the Columbia Forge and Lampros Steel yard at North John Street. A sheen was observed on this runoff during the site visit. CSC constructed an asphalt berm along the southern edge of North Crawford Street to reduce the amount of runoff coming on to the CSC site from up gradient properties.

The runoff from the up gradient properties continues across the CSC property to the UPRR rail spur where it ponds and infiltrates. During heavy rainfall events, this runoff from the up gradient properties can flow to the west to the City of Portland catch basin at the intersection of North Burlington Street and the UPRR rail spur.

Storm water runoff also flows down North Richmond Street to the UPRR rail spur from the up gradient properties.

2.5 Adjacent East (Upriver) of Crawford Street Corporation Property

The property east (upriver) of the North Area of the CSC site consists of a residence and an auto repair shop. The shop is located in an approximately 80-foot by 30-foot building. Vehicles and small construction equipment were observed on the unpaved area around the building.

The property east (upriver) of the South Area, is presently vacant. Various debris are present on the site including concrete debris, tires, and general trash. Vegetation on this adjacent property consists of grasses, blackberries, and small trees. Recent petroleum staining was observed along the UPRR rail spur immediately east of the CSC site.

An approximate 8-inch diameter concrete pipe daylights at the river bank on the property east of the CSC site. No flow was observed coming from the pipe at the time of the site visit (after recent wet weather).

2.6 Adjacent West (Downriver) of Crawford Street Corporation Property

The property west (downriver) of the Northern Area of the CSC site is vacant and used to store steel sheets. This area is not paved.

The property west (downriver) of the Southern Area of the CSC site is the location of the City of Portland Bureau of Environmental Services (BES) laboratory. This area is mostly paved with some landscaped areas. Storm water runoff in the eastern portion of this area is directed to a small ditch and wetland area in the eastern area of the BES property. A waste pile containing asphalt debris was observed on the eastern edge of the BES property, adjacent to the CSC property. The Willamette riverbank also contains concrete and asphalt debris at the eastern edge of the BES property.

2.7 Soil and Groundwater Conditions

2.7.1 Regional and Local Geology and Hydrology

The CSC site is located along the historical flood terrace of the Willamette River. As a result, the regional geology is dominated by river deposits of varying energy underlain by the sand and gravel Troutdale formation. The Troutdale formation is about 100 feet below the ground surface. Fill has also been historically placed along the river on top of the natural river deposits. Regionally, shallow groundwater is present within the river deposits. More productive groundwater zones are present within the underlying sand and gravel Troutdale formation.

Based on soil and groundwater investigations on the southern portion of the CSC site and the properties to the east (Metro/Willamette Cove) and west (City of Portland BES Laboratory) of the CSC site, near surface soil conditions at the CSC site are anticipated to consist of fine sand, silty fine sand, and clayey silt. The depth to shallow groundwater corresponds roughly to the elevation of the Willamette River and is about 20 to 30 feet below the ground surface at the CSC site. Debris, including brick and wood was encountered in the upper 10 feet on the CSC site and on the BES property west of the CSC site. "Manmade" fill was observed to depths up to 6 feet in test pits and borings along the western end of the CSC site on the bluff above the Willamette River shoreline. The fill consisted of a black, angular sand.

2.7.2 Groundwater Use

There is no reported groundwater use on and around the CSC site. A preliminary search of the Oregon Water Resources Department did not note any groundwater supply wells within ½ mile of the CSC site. The area around the site has been serviced by the public water system since the early 1900s.

2.7.3 Hydrologic Setting

The primary surface water body in the CSC site area is the Willamette River. Other than a man-made pond constructed on the City of Portland BES property west (downriver) of the CSC site, no other significant surface waters are present in the CSC site area.

The site is located in an industrial area and much of the ground surface is paved or covered with gravel. The soil on unpaved areas consists generally of sand and silty, fine sand. The 2-year, 24-hour rainfall in the Portland area is about 2.4 inches (BES July 1999 Stormwater Management Manual). Storm water in the site area either infiltrates into the ground or is collected in catch basins and conveyed in the local storm water system.

The CSC site lies above the 100-year Willamette river flood plain. The 1996 flood did not exceed the top of the bank along the CSC site. The slope of the CSC site area is generally towards the south.

SECTION 3

SITE HISTORY

This section summarizes the site use history of the CSC site and the immediate surrounding properties. The site history is based on the review of the Sanborn Fire Insurance maps, the historical aerial photographs, and the City Directories. Some recent site use information was obtained through the interviews with CSC and CSC tenant representatives.

The overall history of the site area includes both residential and industrial use. The site's close proximity to the St. Johns neighborhood and the Willamette River has resulted in both residential and industrial land uses around the area. Land use at and adjacent to the CSC site is industrial.

The St. Johns district of Portland is one of the oldest districts in Portland with development dating back to the 1800s. The area, including the site, has been serviced by public water since the early 1900s. No wells are known to have been present on the site and historical facilities used water pumped from the Willamette River to supplement the local water supply system.

3.1 South Area

As noted in Section 2, the South Area is the portion of the site located between the UPRR railroad spur and the Willamette River. The location of the streets (existing and vacant) used to reference the subareas discussed below are shown on Figure 2-1.

Numerous large log rafts were present along the entire CSC river front, offshore of the CSC site, from the early 1900s to the mid-1970s, all prior to CSC's ownership of the property. No other significant water front activities appear to have occurred. No ship building or ship repair was performed. The limited length of river front where a dock was located (see 3.1.1 below) was used only for staging of sand and gravel.

3.1.1 North Richmond Street to North John Street

3.1.1.1 Activities Prior to CSC Ownership

The earliest available Sanborn Map (1905) shows a closed small lumber mill (Central Lumber Company) along the shore in the western portion of this subarea. The mill extends out into the river on a dock. No fuel tanks are on the map and the map notes that a sawdust-fueled electrical generator powered the mill. The mill was apparently closed in 1904 due to "litigation" and this area was generally vacant by 1911. The 1911 Sanborn map also notes a "Horse Barn" and "Wagon Shed" in this area.

A dock was constructed at end of North Richmond Street sometime between 1911 and 1924. The dock was used solely to stage sand and gravel. There is no evidence that ship building or repair was performed at, or around, the dock, or anywhere else on the site. The dock was removed between the late 1940s and 1950s.

From sometime between 1911 and 1924 to 1973, this area was used for a variety of manufacturing and warehouse activities. American Marine Iron Works (foundry and machine shop) was noted in this area on the 1924 Sanborn Map. From the early 1930s to the 1960s, this area was used by Plylock Corporation (plywood mill). The 1950 Sanborn Map shows a 20,000 SF "Woolen Mill" warehouse in the western portion of this area. The 1969 Sanborn Map shows a "Western Homes" operation on the eastern edge of this area. All of these facilities were noted as using "sawdust" for fuel and no fuel tanks are shown on the Sanborn Maps or apparent on the historical aerial photographs.

Buildings present in this area were demolished starting in the early 1970s. The City of Portland, through the Portland Development Commission, purchased the property in 1979. The last building was removed sometime between 1980 and 1984.

3.1.1.2 Activities During CSC Ownership

Manufacturing Management Incorporated (MMI) purchased this property from the City of Portland in 1988. MMI shortly thereafter transferred the site to the Crawford Street Corporation. In 1989, Lampros Steel started using this area to store structural steel.

There are no records or direct evidence of releases of hazardous substances on this portion of the CSC site during CSC's ownership.

3.1.2 North John Street to North Leavitt Street

3.1.2.1 Activities Prior to CSC Ownership

The earliest Sanborn Map (1905) shows dwellings across most of this area with a small machine shop in the southwest corner. Starting sometime between 1905 and 1911, this area was used to store lumber for the St. John's Lumber Company. This area was used solely to store lumber until the mid-1950s. An April 27, 1924 fire damaged much of the lumber storage area but the area was repaired and the lumber storage continued.

Starting in 1955 to sometime between 1973 and 1977, 12,000 square-foot building was located in the southern portion of this area. The building was associated with the Portland Lumber Company mill and was apparently used to store lumber. The building was demolished and the area was vacant from sometime between 1973 and 1977 to 1989. The City of Portland, through the Portland Development Commission, purchased the property in 1979.

3.1.2.2 Activities During CSC Ownership

MMI purchased this property from the City of Portland in 1988. MMI shortly thereafter transferred the site to the Crawford Street Corporation. In 1989, Lampros Steel started using this area to store structural steel.

There are no records or direct evidence of releases of hazardous substances on this portion of the CSC site.

3.1.3 South/Leavitt to Burlington

3.1.3.1 Activities Prior to CSC Ownership

Historical photographs obtained from the Oregon Historical Society notes this area being undeveloped, except for a few dwellings, in the late 1800s.

The earliest available Sanborn Map (1905) notes this area being used for lumber storage for St. John's Lumber Company. The 1911 Sanborn Map continues to note lumber storage with the addition of a 30,000 square-foot planing mill building and a 55,000-gallon water tower. The water tower was located at the end of the present-day, North Burlington Street and was present until 1969. The planing mill building was significantly reduced in size between 1911 and the 1930s. In the early 1950s, the planing mill was significantly expanded and was present until the mid-1970s.

An April 27, 1924 fire damaged much of the lumber storage platforms along southern edge of this area.

By 1936, a 10,000 square-foot lumber storage building was located in the northern portion of this area. This building was expanded in the early 1950s and was present until the mid-1970s.

The Sanborn Maps note that mill refuse was used for fuel at the lumber mill and no oil tanks are noted on the maps.

The 1969 Sanborn Map shows a small machine shop along the river from in the western portion of this area. The machine shop was apparently associated with the lumber mill and was removed with the other buildings on the site in the mid-1970s. By the late 1970s, the site was vacant and all buildings had been removed. The City of Portland, through the Portland Development Commission, purchased the property in 1979.

Some former and current property tenants and representatives noted that black sand material was imported to the South Area and used for surface fill when the lumber buildings were demolished. The reports of black sand fill are consistent with the black sand observed along the riverbank during the site reconnaissance (Section 2.3).

3.1.3.2 Activities During CSC Ownership

MMI purchased this property from the City of Portland in 1988. MMI shortly thereafter transferred the site to the Crawford Street Corporation. In 1989, Lampros Steel started using this area to store structural steel.

There are no records or direct evidence of releases of hazardous substances on this portion of the CSC site during CSC's ownership.

3.1.4 Previous Environmental Investigation on South Area

In 1988, prior to MMI's purchase of the South Area, MMI retained Sweet-Edwards/Emcon to perform an environmental investigation of the South Area. The investigation included the following:

- Historical review including Sanborn Fire Insurance Map review and an interview with a former onsite worker.
- Water sampling from pipes protruding from ground surface.
- Geophysical survey for subsurface features (e.g. underground storage tanks).
- Five test pits to assess subsurface features suggested from the geophysical survey.
- Removal of an underground storage tank identified from the geophysical survey and test pits.
- Sampling of black sand fill.
- Seven test pits and one soil boring to assess subsurface conditions in the area of the black sand fill.
- One soil boring exploration to assess a possible septic drain and drain field area.
- Soil and groundwater sample laboratory analysis for petroleum hydrocarbons, volatile organic compounds, PCBs, and EP Tox metals.

The study identified and assessed the following possible environmental issues on the South Area of the CSC site:

- Up to about 6 feet of black sand fill is present in the western portion of the South Area along portions of the bank above the Willamette River shoreline. Based on an interview with a former site employee, the fill was reportedly placed during the demolition of the sawmill in 1977-1978, prior to CSC's ownership of the property. The sand was reportedly spent sandblast material that had been used to clean oil tanks. The sand was oily when placed and oily water reportedly migrated briefly to the adjacent river.
- EP Tox metal concentrations in samples of the black sand did not exceed hazardous waste levels. A sample of the material was measured to contain oil and grease at a concentration of 400 mg/kg. No PCBs were detected in the samples of the material. Perched groundwater with a sheen was observed in some of the test pits in the black sand area.
- A groundwater sample from near the black sand fill area did not note any evidence of contamination according to the Sweet-Edwards/Emcon study. Soil beneath the black sand, but above the

shallow groundwater, was not stained and did not indicate evidence of contamination. The shallow groundwater was about 26 feet beneath the bottom of the fill material.

- Soil and groundwater samples collected from the test pits and the soil boring in the area of the former septic tank and drain field did not note any evidence of contamination.
- The underground storage tank identified from the geophysical survey and test pit explorations was located in the southeastern portion of the South Area. A sample of the contents of the tank was found to be diesel. The tank was removed and properly disposed offsite. No field evidence of contamination was observed during the tank removal. Two soil samples collected from the bottom of the tank excavation and a third sample from the fill port area were analyzed for oil and grease. Oil and grease was detected in the bottom soil samples at concentrations of 100 mg/kg and 200 mg/kg. Oil and grease was detected in the soil sample from the fill port area at a concentration of 100 mg/kg.
- A reconnaissance of the river bluff did not note any groundwater seeps in the exposed bank.

3.2 North Area

As noted in Section 2, the North Area is the portion of the site located between the UPRR railroad spur and North Crawford Street. The location of the streets used to reference the subareas discussed below are shown on Figure 2-1.

3.2.1 North Richmond Street to North Charleston Street

3.2.1.1 Activities Prior to CSC Ownership

The earliest available Sanborn Map (1905) shows only a few dwellings and a small machine shop in this area.

By 1911, a 9,000 square-foot machine shop was located in this area. The foundry in the machine shop was fueled by coal. Two dwellings are also noted in this area on the 1911 Sanborn Map. The 9,000 square-foot building is vacant and only the dwellings remain in the 1924 Sanborn Map.

From the mid 1930s to 1948, this area was used for lumber storage. The site was no longer used for lumber storage from about 1950 to the early 1970s when logs were stored in this area.

The building was removed in 1973 and by 1977, the site was not used and was vacant with vegetation.

3.2.1.2 Activities During CSC Ownership

MMI purchased this property from the City of Portland Development Commission in 1988. MMI shortly thereafter transferred the site to the Crawford Street Corporation. In the mid-1990s, Lampros Steel started using the middle of this area to store structural steel.

There are no records or direct evidence of releases of hazardous substances on this portion of the CSC site.

3.2.2 North Charleston Street to North John Street

3.2.2.1 Activities Prior to CSC Ownership

From before 1905 to the mid-1930s, only dwellings were present in this area. Starting in the mid-1930s to the mid-1940s, this area was used to store lumber. The 1950 Sanborn Map shows a small auto repair shop (noted in the City Directory as Love Fuel Company) and a single dwelling on this area. No fuel tanks are shown to be associated with this facility.

Sometime between 1957 and 1960, a 200-foot by 200-foot building was constructed, covering almost this entire area. The 1969 Sanborn Map notes the building being used by Portland Manufacturing Company to store lumber.

The City of Portland Development Commission (PDC) acquired the property in the 1970s. While the PDC owned the property, the City of Portland used the building for general maintenance operations.

3.2.2.2 Activities During CSC Ownership

MMI purchased this property from the City of Portland Development Commission in 1988. MMI file information notes that there was a drum of Silvex in the PDC building when the building was purchased by MMI in 1988.

This building is currently present on the site and has been used by Lampros Steel since 1989. Shortly after purchasing the property, MMI transferred the site to the Crawford Street Corporation.

There are no records or direct evidence of releases of hazardous substances on this portion of the CSC site.

3.2.3 North John Street to North Leavitt Street

The earliest available Sanborn Map (1905) shows this area vacant. This area remains vacant except for periodic use for storage of plywood and lumber mill wood waste, until the mid-1950s when a 1,700 square-foot "Pattern Shop" is constructed in the northern portion of this area. The pattern shop is noted as "Peninsula Pattern Works" in the 1960 through 1970 City directories.

By 1961, the use of the western area of site, including "Pattern Shop" appeared to be associated with Skookum Logging Equipment, located to the west of this area. The use of the eastern portion of this area was associated with the 200-foot by 200-foot building located to the east.

Columbia Forge moved into the Pattern Shop building in 1971. The building is expanded in 1972 to what is currently the Columbia Forge office and Building 1. The current oil storage building was also constructed in 1972.

CSC files indicate that two underground storage tanks (USTs) were formerly present in this portion of the CSC site. Both tanks were removed in 1987. The approximate former locations of the tanks are shown on Figure 2-4.

One tank was located near the southern portion of the area in the "weld shop." This tank was a 1,000-gallon steel tank and was installed in the late 1960s. The tank was used to store Bunker C oil. A second tank was located along the northern edge of the site and was referred to as the "Yard" tank. This tank was a 1,000-gallon steel tank and was installed in the mid-1950s. This tank was used to store gasoline.

Soil samples were collected from the tank excavations and analyzed for petroleum hydrocarbons when the tanks were removed. The sample from the "Yard" UST was also analyzed for total lead and EP Toxicity lead. Diesel was not detected in either of the soil samples and gasoline petroleum hydrocarbons were detected only in the sample from the Yard UST excavation at a concentration of 16 mg/kg. The measured total lead concentration in the soil sample from the Yard UST was in the range of typical background concentrations and lead was not detected in the EP toxicity analysis. The laboratory report for the soil chemical analyses is presented in Appendix B.

A very small quantity (2 to 3 ounces) of PCB-containing oil was spilled inside an electrical induction heater cabinet in May 1987. The entire cabinet was removed from the site and disposed properly by General Electric. No PCB oil was released outside the cabinet and no PCBs were released to the ground. There is no potential for the contained spill of PCB oil to have caused an impact to the Willamette River water or sediments.

In 1997, BES collected a storm water sample from the western drain pipe outlet from the Columbia Forge yard area (see Section 2.2.3 and Figure 2-4). The sample was analyzed for metals. Low concentrations of copper (10 µg/L), selenium (47 µg/L), and zinc (65 µg/L) were detected in the sample. Lead, cadmium, and chromium were not detected in the storm water sample.

3.2.4 North Leavitt Street to North Burlington Street

The earliest available Sanborn Map (1905) notes five dwellings on this area of the site. The dwellings are also present on the 1911 map along with a building labeled "Portland Collapsible Box" on the southeast corner

of the site. A "Lauther's Mercantile Warehouse" is also shown on the southwest corner of this area on the 1911 Sanborn Map.

By 1924, Skookum Logging Equipment Company began operations on this area of the site except for the northwest corner of the area where three dwellings were located. The Skookum operations included a machine shop in the southeast corner and a coal bin in the southern portion of the area. The Skookum facility also included a brass foundry in the northern portion of the site. Warehouses used to store hay and wire cable were noted in the southwest portion of this area in the 1924 Sanborn Map.

The foundry was expanded sometime between 1924 and 1936 and 1940 when the last remaining dwellings in this area were removed. The warehouses in the southwest portion of this area were removed in the late 1940s.

By 1950 Skookum Logging Equipment occupied the entire eastern half of this area. The Skookum operations had been expanded to include a foundry with two furnaces, a hammer forge, and a machine shop in the southeast corner.

The 1950 Sanborn Map shows Portland Chain Manufacturing Company occupying the western half of this area. The Portland Chain Manufacturing Company was mostly an open yard with five forge furnaces. A 3,500 square-foot building was located in the northwest corner of this area.

The buildings on the eastern half of this area were expanded in the period 1950 to 1955 such that the entire eastern half of this area was covered. Between 1963 and 1964, the building currently existing on the western portion of this area was constructed.

CSC files indicate that an UST was formerly present in this portion of the CSC site. The UST was removed in 1987. The approximate former location of the tank is shown on Figure 2-4. This tank was a 5,000-gallon steel tank and was used to store diesel. It is not clear when the tank was installed but it appears to have been installed before 1960. A soil sample was collected from the tank excavation and analyzed for petroleum hydrocarbons when the tank was removed. Gasoline or diesel was not detected in the soil sample. The laboratory report for the soil chemical analyses is presented in Appendix B.

3.2.5 Previous Environmental Investigation on North Area

The environmental investigation performed by Sweet-Edwards/Emcon in 1988 and described in Section 3.1.4 also included a historical review and site reconnaissance of the North Area. No soil or groundwater samples were collected in the North Area as part of the 1988 investigation.

The 1988 historical review and site reconnaissance noted the following:

- An 8-inch, buried, Union Pacific Railroad diesel pipeline is present beneath North Crawford Street.

- Three underground storage tanks had been previously located on the Columbia Forge and Lampros Steel areas. The tanks were removed in 1987. Petroleum hydrocarbons were detected at a concentration of 16 mg/kg in one sample. Petroleum hydrocarbons were not detected in the other two soil samples.
- Oily runoff of storm water occurs from the Columbia Forge and Lampros Steel areas. The runoff pools along the UPRR rail road spur along the southern edge of the Columbia Forge and Lampros Steel areas.
- A fuel pump island and, presumably, an underground storage tank are present on the St. Johns Truck and Equipment property north of North Crawford Street. An outside steam cleaning area with a drain was also observed on the St. Johns Truck and Equipment property.

The Sweet-Edwards/Emcon report did not recognize the flow of storm water onto and across the CSC site from the properties upgradient (i.e. north) of the CSC site.

3.3 Adjacent North of Crawford Street Corporation Property

From before the earliest Sanborn Map available (1905) to the mid 1950s, the area north of the CSC site was mostly vacant with a few dwellings. Starting in the 1920's, the far west end was also used for lumber storage.

In the early 1960s, a building was constructed along the north side of North Crawford Street, between North John and Leavitt Streets. The building was used initially for a fuel business (St. Johns Fuel Company) and then for truck repair (Hildebrand Truck and Equipment starting between 1970 and 1975). The truck repair shop is still operated on this area north of the site. Since its construction, more and more debris, equipment, and trucks have been placed around the truck repair building.

The property between North Burlington and Leavitt Streets was used for lumber storage up to the late 1960s. From that time to the present, this area has been used for auto and truck parking.

By 1991, a large amount of debris, equipment, and trucks in varying degrees of disassembly were present on almost all of the properties north of the CSC site. As discussed in other sections of this PA report, storm water runoff from these areas flows to, and across, the CSC site. Sheens have been observed on this runoff coming from the properties north of the CSC site.

A fuel pump was present on the St. Johns Truck and Equipment site in the late 1980s. Such a pump would have most likely been associated with underground storage tanks. DEQ has no records of USTs on the St. Johns Truck and Equipment site. However, City of Portland Fire Bureau records note a 2,000-gallon diesel tank and two 8,000-gallon gasoline tanks being installed on the St. Johns Truck and Equipment site. No files

were found at DEQ or the Fire Bureau indicating that the tanks have been removed.

3.4 Adjacent East (Upriver) of Crawford Street Corporation Property

3.4.1 General History

The earliest available Sanborn Map for this area (1911) shows a dock along the river front, east of the CSC site. By 1924, the area east (upriver) of the CSC site was the site of a large plywood mill. The plywood mill was present in this area through the late 1960s. From no later than 1950 to its closure, the mill was operated by Plylock.

The several Sanborn Maps covering this area over this period note glue storage areas. Phenol-based glue was a typical industrial product used at similar operations. The glue was presumably used to attach the wood veneers to form the plywood. Other hazardous substances typically associated with plywood mills include petroleum hydrocarbons from lubricating oils.

By the later 1960s, the plywood mill was abandoned and only a small cabinet shop remained operating in the area east (up river) of the CSC site. The plywood mill buildings and the dock along the river front were demolished in 1971 and 1972. By 1973, the area east of the CSC site was vacant with bare ground.

The property east of the CSC site is currently owned by the Metropolitan Regional Center (Metro) who recently purchased the site from the City of Portland.

3.4.2 Previous Environmental Investigation on Property East (Upriver) of Crawford Street Site

In 1988 and 1989, Sweet-Edwards/Emcon was retained by Grayco Resources to perform a Level I environmental site assessment and field investigation of the property east (up river) of the CSC site and south of the UPRR rail tracks. The investigation consisted of an historical review, a site reconnaissance, geophysical survey, 13 test pits, four hand auger borings, and 19 soil borings. Chemical analysis was performed on 25 soil samples and 22 groundwater samples. PCBs were detected in groundwater samples from soil borings on the western end of the investigation area, near the east end of the CSC site.

In 1994, the City of Portland retained Century West Engineering Corporation to perform a Phase I and Phase II environmental site assessment of the property east of the CSC site, north of UPRR rail tracks, and south of vacated North Bradford Street. The investigation consisted of an historical review, a site reconnaissance, and excavation of 12 test pits. No soil or groundwater samples were collected for

chemical analysis from the test pits. The investigation did not note any evidence of contamination on the site.

In 1995 Emcon was retained by Metro to perform additional soil, groundwater, and sediment sampling on the property east of the CSC site and south of the UPRR rail tracks. Soil samples were collected from a series of soil borings and groundwater monitoring wells. Samples from the western end of the site (near the east end of the CSC property), noted PAHs in soil, groundwater, and sediment.

3.5 Adjacent West (Downriver) of Crawford Street Corporation Property

3.5.1 General Site History

The earliest available Sanborn Map for this area (1911) shows a dock along the river front, west of the CSC site. By 1911, the area west (downriver) of the CSC site was the site of a large lumber mill. The lumber mill operations included a large dock. The major operations of the lumber mill were present on this area through the mid-1950s. From the mid-1950s to its closure in the mid-1970s, this area was used for lumber storage and mill refuse management. The dock was present and used from the early 1900s to when the mill was demolished in the late 1970s.

The mill was operated by St. Johns Lumber until between the late 1920s and the early 1930s. From this period to its closure in the mid-1970s, the mill was operated by Portland Lumber Mills. The mill produced wooden boxes.

The mill operations included mill refuse handling and burning. Lumber mill operations also typically include use of lubricants and oils.

The property west of the CSC site was purchased by the City of Portland Development Commission (i.e. City of Portland) in the late 1970s when the former lumber mill and box manufacturer ceased operations on the site.

3.5.2 Previous Environmental Investigation on Property West of Crawford Street Site

In 1988, CSC considered purchasing the property west (downriver) of the CSC site from the City of Portland Development Commission (PDC). As part of their consideration of the property, CSC retained Sweet-Edwards/Emcon to assess potential soil and groundwater contamination issues on the property. The investigation noted several soil and groundwater contamination issues on the PDC property including:

- Over 500 cubic yards of black fill material containing petroleum hydrocarbons and halogenated organic compounds in the western portion of the property.

- Uncontrolled fill containing demolition waste and trash in the southern portion of the property.
- Halogenated organic compounds and 2,4-dichlorophenol in shallow groundwater at the site.

The file information also indicates that underground storage tanks associated with the former lumber mill were formerly present immediately north (upgradient) of the City of Portland property.

In 1994, the City of Portland Bureau of Environmental Services (BES) retained RZA Agra to perform an environmental site investigation at the property west of the CSC South Area property. The investigation included:

- Site history review
- Twenty test pit excavations
- Drilling and construction of five groundwater monitoring wells
- Five test trenches

Samples of black sand material encountered in the test trenches were measured to have petroleum hydrocarbon concentrations up to 667 mg/kg. About 2,113 cubic yards of black sand material was removed from the site based on visual criteria. Pentachlorophenol was detected in a groundwater sample from a well in the southeastern corner of the site at a concentration of 18 µg/L.

In October 1994, a drilling contractor penetrated an abandoned electrical conduit filled with PCB insulating oil on the eastern portion of the City of Portland property. A series of test pits were performed and about 150 cubic yards of PCB contaminated soil was excavated. Five of the 15 confirmation soil samples collected from the excavation after the soil excavation was completed had PCB concentrations greater than 1 mg/kg.

SECTION 4

ASSESSMENT OF POTENTIAL SOURCES AND PORTLAND HARBOR PATHWAYS OF EXPOSURE

This section presents the assessment of potential contaminant sources on the CSC site, the potential contaminant migration pathways from the CSC site sources to the Willamette River, and the potential receptors associated with the Willamette River.

The sources and pathways were identified based on the recent site conditions and operations. The following potential sources and migration pathways were identified and assessed:

- Former underground storage tanks
- Storm water runoff from Columbia Forge

For the purposes of this PA, only those on-site sources and migration pathways possibly occurring during CSC ownership of the site and as a result of operations performed by CSC are considered. In particular, only operations and possible releases occurring after 1988 on the entire South Area and the eastern 500 feet of the North Area were considered in this PA. CSC's predecessor-in-interest did not own the western portion of the North Area until the 1930s.

Only those potential sources and migration pathways associated with contaminants identified by DEQ as COIs in the Willamette River sediments are included in the assessment.

4.1 Possible Willamette River Receptors

The potential exposure receptors associated with the Willamette River are presented in the DEQ Site Strategy Recommendation. These receptors include:

- Persons participating in recreational boating, swimming, and beach use.
- Persons participating in recreational and subsistence fishing.
- Habitat and migration pathway for fish including Chinook salmon and steelhead, which are listed as threatened species under the Federal Endangered Species Act.
- Benthic community in the river sediments
- Habitat for birds and wildlife.

The potential contaminant sources and migration pathways discussed in this section are those that could possibly impact the above potential Willamette River receptors as presented by DEQ in the site strategy recommendation.

4.2 Underground Storage Tanks

Three underground storage tanks were previously located on the CSC site. Table 4-1 summarizes the tank characteristics and locations.

Table 4-1
Former Underground Storage Tanks on CSC Site
Crawford Street Corporation Site PA

Name/ Reference	Location	Size (gal)	Contents	Date Installed
Weld Shop	Outside the southwest corner of Building 1 in southeast corner of the Columbia Forge yard.	1,000	Bunker C oil	1950s
Skookum	Northern edge of the Lampros Steel property at the western end of the CSC site.	5,000	Diesel	Prior to 1960
Yard	Northern edge of the CSC site in the Columbia Forge yard	1,000	Gasoline	Late 1960s

All of these USTs were removed in 1987. Soil samples were collected from the excavation of each tank and analyzed for petroleum hydrocarbons. As noted in Sections 3.2.3 and 3.2.4, petroleum hydrocarbons were not detected in two of the samples and were detected at a concentration of 16 mg/kg in the third sample (from the Yard UST excavation).

Based on the lack of petroleum hydrocarbons in the soil samples from each of the three UST excavations, no releases of petroleum hydrocarbons occurred from the USTs. Therefore, there is no potential for the USTs to have caused an impact to the Willamette River water or sediments. No further assessment of the USTs as possible sources is necessary.

4.3 Storm Water Runoff and Infiltration from Columbia Forge

As noted in Section 2.2.3, storm water runoff from the Columbia Forge yard is collected in catch basins and conveyed to the area along the UPRR rail spur where it infiltrates into the ground. Particulate contaminants from the Columbia Forge site conveyed in the storm water runoff would be deposited in the surface soil as the storm water infiltrated

into the soil. Because of the relative low solubility of the possible contaminants associated with the Columbia Forge site, runoff contaminants would likely consist of contaminated particulates rather than dissolved contaminants.

The area along the UPRR tracks collects stormwater runoff from the entire hillside north of the Crawford Street site. During heavy rainfall, including during the site visit for this PA, storm water runoff flows from the properties to the north of the Crawford Street site, across Crawford Street, and onto the Crawford Street property. Significant sheet flow was observed particularly from the abandoned North John Street area into, and across, the Columbia Forge and Lampros Steel storage yard. As noted in Section 2.4, debris, heavy equipment, and disassembled trucks are, and have been, present on these properties and runoff from these properties likely contains petroleum hydrocarbons and metals. Significant surface water runoff also flows down North Richmond Street and North Burlington Street to the UPRR rail spur.

CSC constructed a 200-foot long asphalt berm along the southern edge of Crawford Street yard to reduce the runoff from the upslope sites entering the CSC property. Prior to CSC's construction of the berm, offsite stormwater runoff flowed freely across the Columbia Forge yard and into the yard catch basins.

4.3.1 Possible Surface Water Migration Pathway

During long periods of heavy rainfall, ponded water along the northern edge of the UPRR tracks may eventually drain into the City of Portland storm water catch basin on North Burlington Street. The City of Portland catch basin is connected to the local combined storm water system, which discharges to the Willamette River at Outfall 50 on the City of Portland property west of the CSC site. Because this ponded water may include runoff from the Columbia Forge yard (along with runoff from the properties north of the CSC site), there is some potential for storm water runoff from the Columbia Forge yard to flow to the Willamette River. CSC Contaminants of Interest (COIs) present in the stormwater runoff (if any) could possibly, therefore, migrate to the Willamette River.

4.3.2 Possible Groundwater Migration Pathway

There is a slight potential that dissolved contaminants in the infiltrating stormwater (if present) could migrate down through the vadose zone and eventually impact the underlying shallow groundwater. The shallow groundwater is expected to flow toward the Willamette River and eventually discharge into the river.

The storm water is expected to have, at the most, only modest contaminant concentrations of relatively insoluble COIs and the depth to shallow groundwater is 20 to 30 feet. Therefore, the potential for groundwater to have been impacted by stormwater runoff and for the groundwater impacts to extend to the Willamette River is small. Such groundwater impacts to the Willamette River from the CSC site, if they

exist, would be indicated by high COI concentrations in the near surface soil near where the runoff from the Columbia Forge yard infiltrates.

4.3.3 Possible Air Migration Pathway

Once COIs, if present, are deposited in the surface soil from infiltrating stormwater, there is some theoretical potential for the contaminants to migrate through the air to the Willamette River. In particular, soil particulates with absorbed COIs could become wind born and migrate to the river with blowing dust. The potential for such impacts to the Willamette River through the air, would be indicated by high COI concentrations in the near surface soil near where the runoff from the Columbia Forge yard infiltrates.

Given the very high dispersion of the contaminated soil particulates that would occur in the air and river, contaminant concentrations in the surface soil would have to be very high before air migration of contaminants could possibly, materially affect the Willamette River sediment.

SECTION 5

SAMPLING AND ANALYSIS OF SOURCE/PATHWAYS OF CONCERN TO PORTLAND HARBOR

This section presents the sampling and analysis program that will be performed at the Crawford Street site as part of the PA. The purpose of the sampling and analysis will be to assess whether releases of Contaminants of Interest (COIs) have occurred from potential source(s) and whether released COIs have migrated through the identified potential pathways to the Willamette River. Potential source(s) that require further assessment are discussed in Section 4.

5.1 Contaminants of Interest

A sediment sample collected by the U.S. Environmental Protection Agency (EPA) in 1997 from offshore of the CSC site was determined by DEQ to contain elevated concentrations of a few hazardous substances. DEQ determined the hazardous substances to be "elevated" based on their concentrations relative to "baseline" concentrations elsewhere in the Portland Harbor. Using this approach, DEQ identified the following as Contaminants of Interest (COIs) for the CSC site:

- Arsenic
- Lead
- Mercury
- Di-n-butylphthalate
- Low molecular weight polynuclear aromatic hydrocarbons (LPAHs)
- High molecular weight polynuclear aromatic hydrocarbons (HPAHs)
- Organotins

The DEQ Environmental Cleanup Site Information (ECSI) Site Summary Report for the CSC site notes that "Mercury and PAH sediment contamination appears (sic) contribution from upstream sources."

There have been no activities on the CSC site associated with organotins. No ship repair or shop painting work has been performed on the CSC site. Over water activities, off of the CSC site, by previous owners was limited to loading of sand and gravel barges at the far eastern end of the site from early 1900s to the late 1940s. Therefore, there is no potential for releases of organotins to have occurred on the CSC site and organotins are not considered a COI at the CSC site.

It is doubtful whether arsenic is actually a COI for the CSC site. The measured arsenic concentration in the sediments offshore of the CSC site (5 mg/kg) is well within typical natural background concentration in the Portland area and only 1 mg/kg greater than the "baseline" concentration established by DEQ. The method detection limit for the arsenic analyses in the EPA study often exceeded the DEQ baseline concentration. Furthermore, arsenic concentrations in suspended sediment entering the Portland Harbor from upstream sources is in the range of 5 to 10 mg/kg. Therefore, the arsenic concentrations in the sediment offshore from the CSC site are not indicative an upland source of arsenic on the CSC site.

5.2 Source/Pathways of Concern

As noted in Section 4.3, there is a potential for COIs to be released from the Columbia Forge yard to the surface soil and possibly migrate through periodic surface water flow to the local storm water system. There is also a small potential for the surface water COIs, if present, to impact the underlying shallow groundwater. Given the non-volatile nature of the COIs, volatilization of the COIs is not expected to be a significant migration pathway.

The relative concentrations of COIs in the surface soil in the area where the Columbia Forge surface runoff infiltrates into the ground would be indicative of the potential for the surface water or groundwater pathways to be significant COI migration pathways. If significantly elevated concentrations of COIs (relative to the upgradient and background concentrations) are not present in the surface soil, elevated concentrations of COIs would not be expected in the surface water runoff or shallow groundwater.

Runoff from the Columbia Forge yard is commingled with storm water runoff from the uphill properties to the north and from runoff from along the UPRR tracks east of the site (the ground slope along the UPRR tracks slopes gently down east to west). Past and current activities on these properties have likely resulted in releases of petroleum hydrocarbons and other COIs to the surface water runoff from the properties. Sampling of surface soil down gradient of the Columbia Forge yard to assess the potential for releases from the yard must also consider the likely sources of COIs up gradient from the Columbia Forge property.

5.3 Proposed Sampling Program

This section describes the specific PA sampling and analysis program that will be performed to assess whether COIs have been released from the Columbia Forge yard to the surface soil and possibly migrated to the Willamette River through the surface water, groundwater, and air pathways.

5.3.1 General Scope of Sampling Program

The PA sampling and analysis program will consist of collecting surface soil samples from six locations along the UPRR rail spur and analyzing the soil samples for the COIs identified by DEQ. Figure 5-1 shows the proposed PA sampling locations. Table 5-1 summarizes the proposed locations and their rationale.

Table 5-1
Proposed PA Surface Soil Sample Locations
Crawford Street Corporation Site PA

Sample	Location	Rationale
SS-1	50 feet west of Richmond Street, along north side of UPRR rail spur.	Assess background soil concentrations along UPRR rail spur
SS-2	At foot of Richmond Street, along north side of UPRR rail spur.	Assess impacts from offsite runoff down Richmond Street.
SS-3	Between southern exit from the Columbia Forge/Lampros Steel yard and the UPRR rail spur.	Assess impacts from offsite runoff onto and through the paved yard.
SS-4	Between outlet drain from catch basin near drop forge and UPRR rail spur.	Area of infiltration for Columbia Forge yard runoff. Assess impacts from Columbia Forge yard runoff
SS-5	Between outlet drain from catch basin at eastern entrance to Building 2/3 and UPRR rail spur.	Area of infiltration for Columbia Forge yard runoff. Assess impacts from Columbia Forge yard runoff
SS-6	At foot of North Burlington Street, along north side of UPRR rail spur.	Assess impacts from offsite runoff down North Burlington Street.

Surface soil contamination is expected to be the most indicative of possible releases to the soil from surface water runoff. Therefore, the soil samples will be collected from the upper 6-inches of the ground surface at the proposed locations shown in Figure 5-1 and described in Table 5-1.

5.3.2 Sampling Procedures

Each surface soil sample will consist of five subsamples composited into a single sample. The subsamples will be collected in a 5-point dice pattern across an approximately 5-foot by 5-foot area at each sample location. The composite soil sampling will provide a more representative assessment of the surface soil contaminant concentrations at each sample location.

Each sample will be collected using the following procedure:

- Scrape away surface vegetation, if present, at each subsample location.

- Excavate a minimum 6-inch deep hole with a clean shovel at each subsample location. If necessary, a clean pick will be used to penetrate the surface.
- After the hole is excavated, collect the soil sample across the upper 6-inches of the sidewall of the hole with a clean trowel or spoon. Exclude large gravel or organic debris from the sample.
- Place the subsample in the laboratory-supplied glass container. Fill the container about 1/5 with each subsample. Instruct the analytical laboratory to thoroughly mix the sample before collecting the aliquot for analysis.
- Place the filled sample container in a chilled cooler for transport to the analytical laboratory.

The samples will be collected and transported using proper chain-of-custody procedures. Field notes will be maintained noting the general soil conditions and any unusual or unanticipated conditions.

5.3.3 Analytical Laboratory Analysis

Each soil sample will be analyzed for the CSC site COIs using the following methods:

- PAHs by EPA Method 8310 or 8270 SIM
- Di-N-butylphthalate by EPA Method 8270
- Lead by EPA Method 3050/6010
- Mercury by EPA Method 7471

A QA/QC review of the laboratory data will be performed once the data is received from the analytical laboratory. This review will include the following:

- Chain-of-custody complete and correct
- Analysis within holding times
- Chemicals of interest in method blanks
- Blank spike recoveries within accuracy control limits
- Blank spike duplicate results within analytical precision control limits
- Surrogate recoveries within accuracy control limits
- Matrix spike recoveries within accuracy control limits
- Matrix spike duplicate results within analytical precision control limits
- Detection limits sufficiently low

On the basis of the results of the QA/QC data review, the data will be flagged according to standard EPA procedures. Questionable data will

be flagged with a "J" and considered an estimated value. Data unacceptable for its intended use will be rejected and flagged with an "R."

5.3.4 Reporting

The results of the PA sampling will be presented in a report once the results of the chemical analysis are received from the laboratory. The report will include the following:

- Table showing the results of the chemical analysis.
- Figure showing where the samples were collected.
- Description of the soil and general site conditions in the area where the samples were collected.
- Discussion of any unanticipated or unusual conditions encountered while collecting the soil samples.
- Copy of the analytical laboratory report.

The report will also include a brief assessment of the potential for releases and migration of hazardous substances based on the results of the PA sampling.

The PA sampling results will be analyzed by comparing the relative COI concentrations in the soil samples from along the UPRR rail spur. In particular, if the COI concentrations in the surface soil samples from where the Columbia Forge storm water runoff infiltrates are greater than the COI concentrations in the other surface soil samples, additional sampling will be performed. Additional sampling will likely include surface water samples collected during rainfall events at the surface soil sample locations and groundwater samples collected at the down gradient edge of the CSC site.

A detailed sampling and analysis plan for any necessary additional sampling, including specific sample types and locations, will be prepared as part of the PA sampling report.

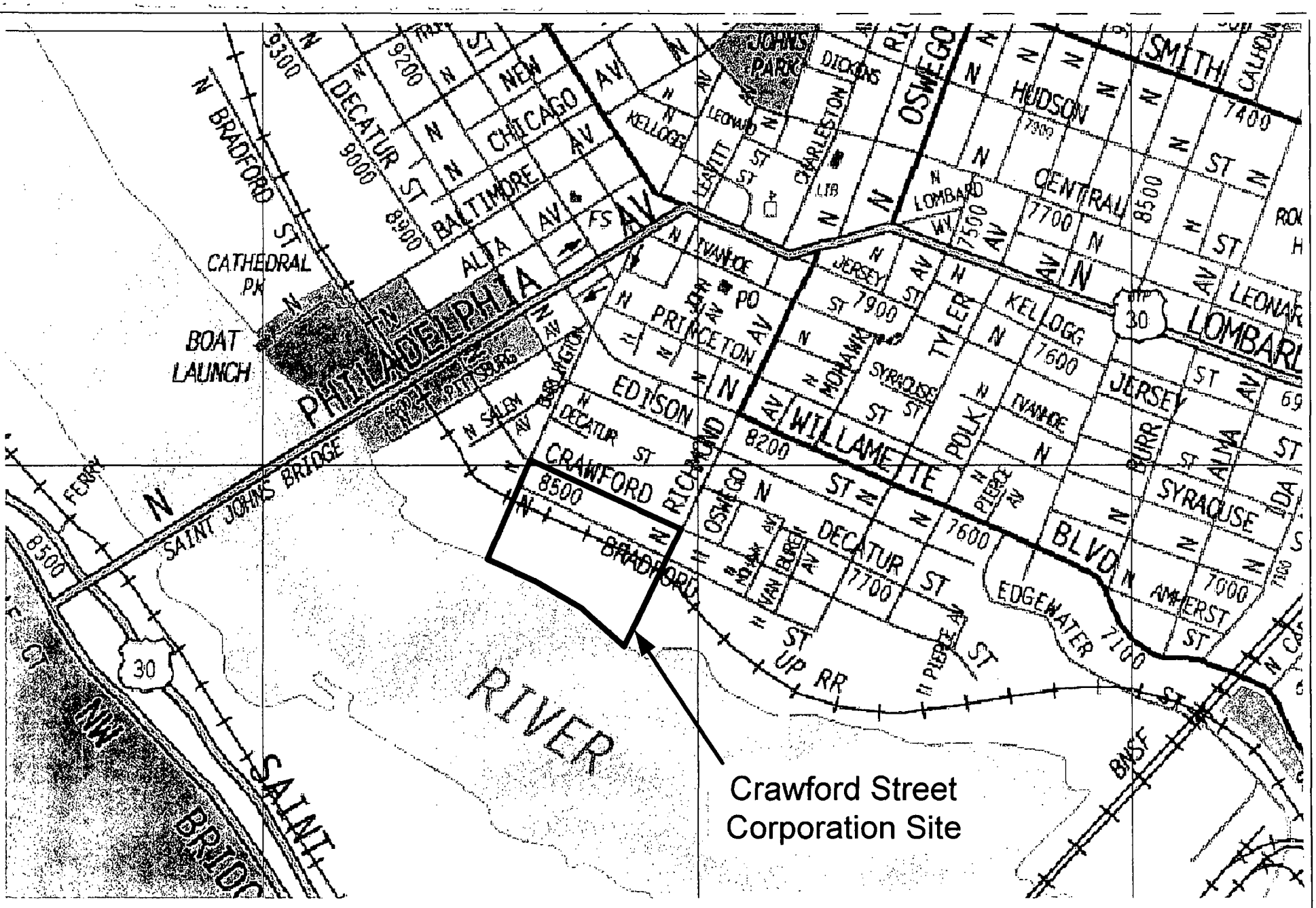


Figure 1-1
Site Location Map
Crawford Street Corporation Site

BRIDGEWATER GROUP, INC.

UPRR Diesel Pipeline

N. Leavitt

N. John

N. Charleston

N. Crawford

Steel Plate Storage

N. Burlington

Lampros Steel

TLS Steel

Columbia Forge

Columbia Forge and Lampros Steel Storage Yard

Lampros Steel

Vacant Lot

N. Richmond

Residence Auto Repair

UPRR Diesel Pipeline

UPRR Railroad Spur

Lampros Steel Storage Yard

City of Portland BES Lab

Willamette Cove/Metro

Top of Bank

Chain-Link Fence

Willamette River

(Project North)

N

80 Feet

Approximate Scale

Figure 2-1
Site Plan
Crawford Street Corporation Site

BRIDGEWATER GROUP, INC.

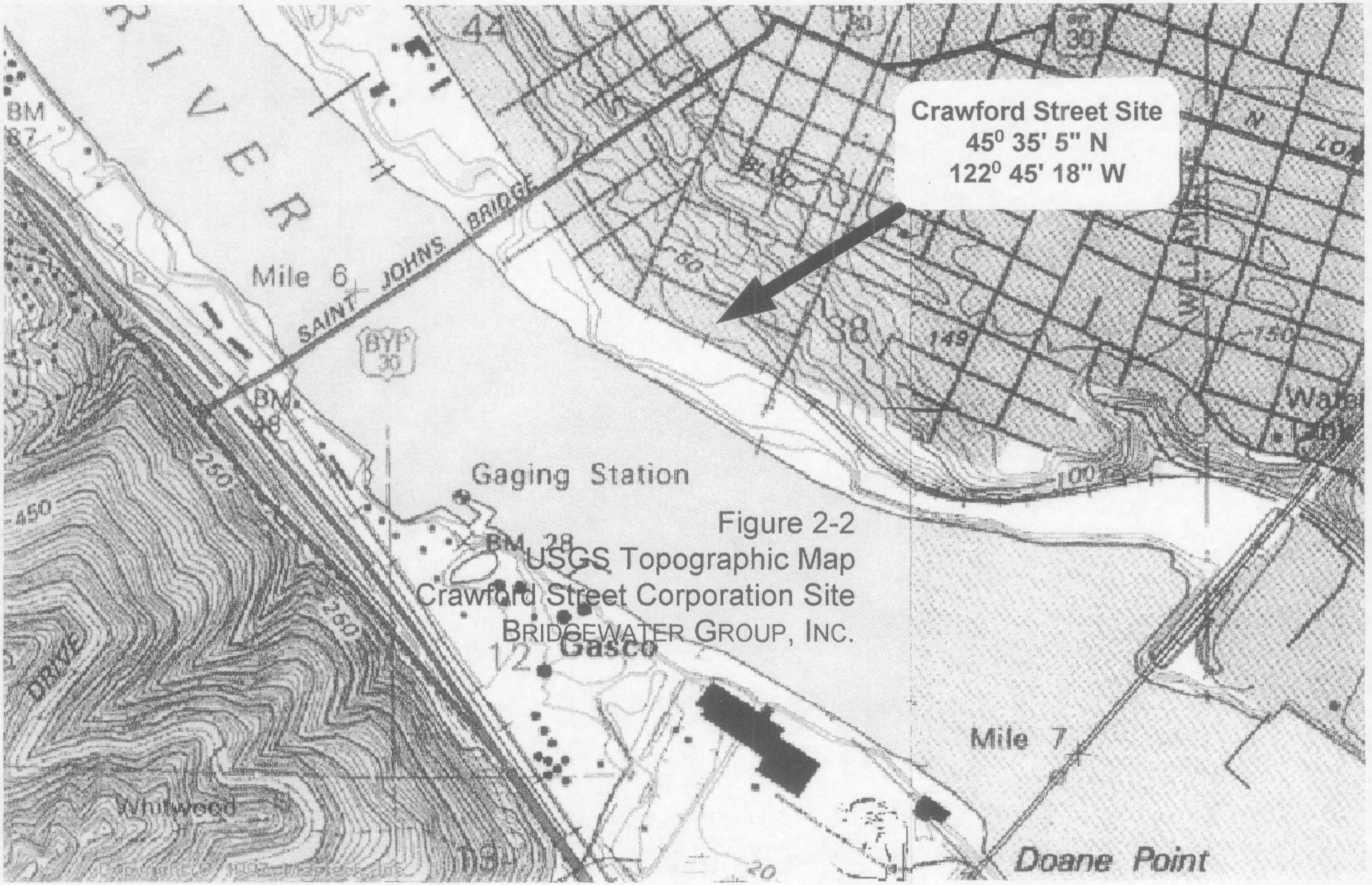


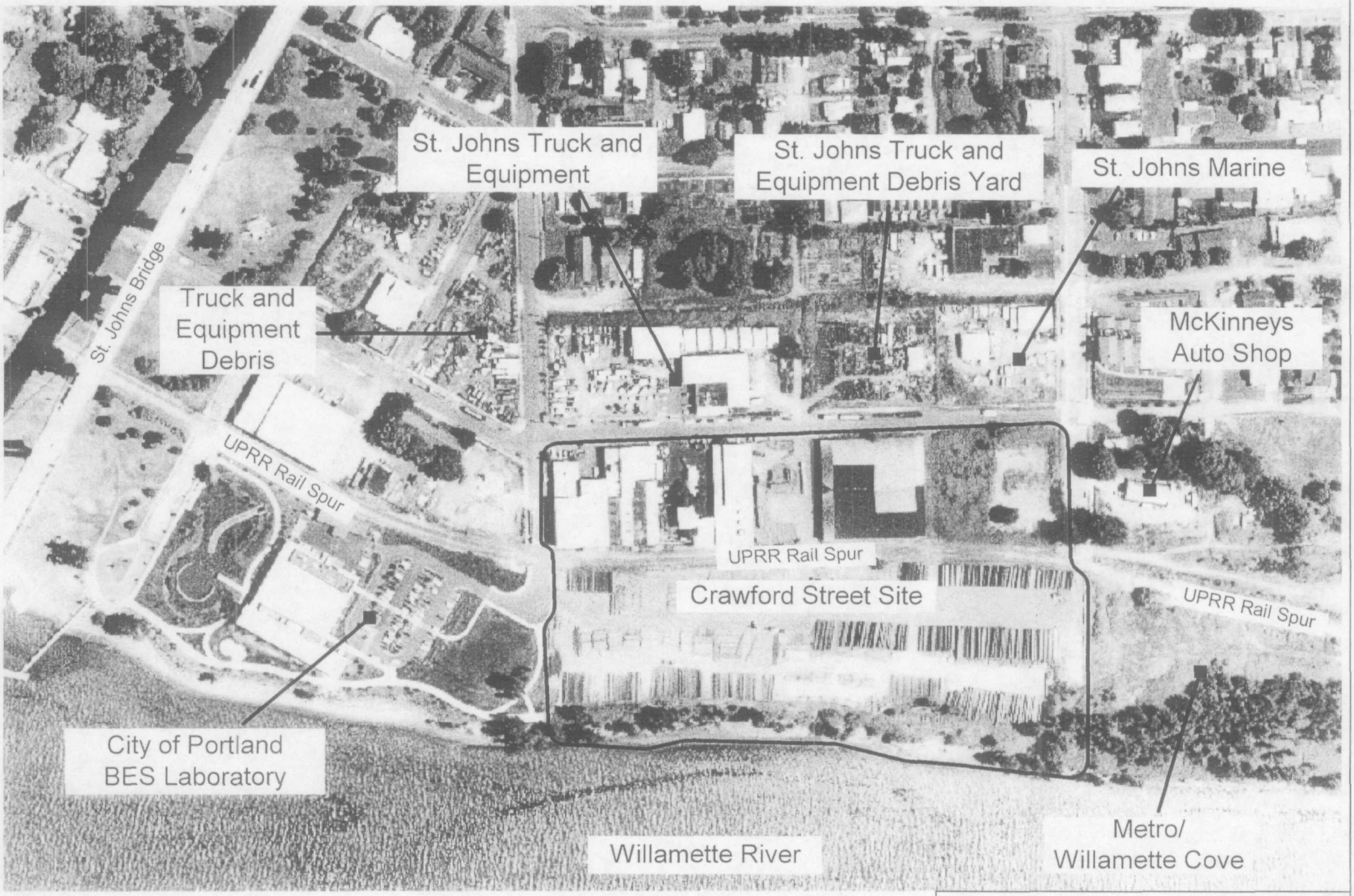
Figure from USGS
Topographic Map Linnton
and Portland Quadrangles
Photorevised 1990

Approximate Scale

833 feet

Figure 2-2
USGS Topographic Map
Crawford Street Corporation Site

BRIDGEWATER GROUP, INC.



(Project North)

N

Approximate Scale

260 Feet

Figure 2-3
1998 Aerial Photograph
Crawford Street Corporation Site

BRIDGEWATER GROUP, INC.

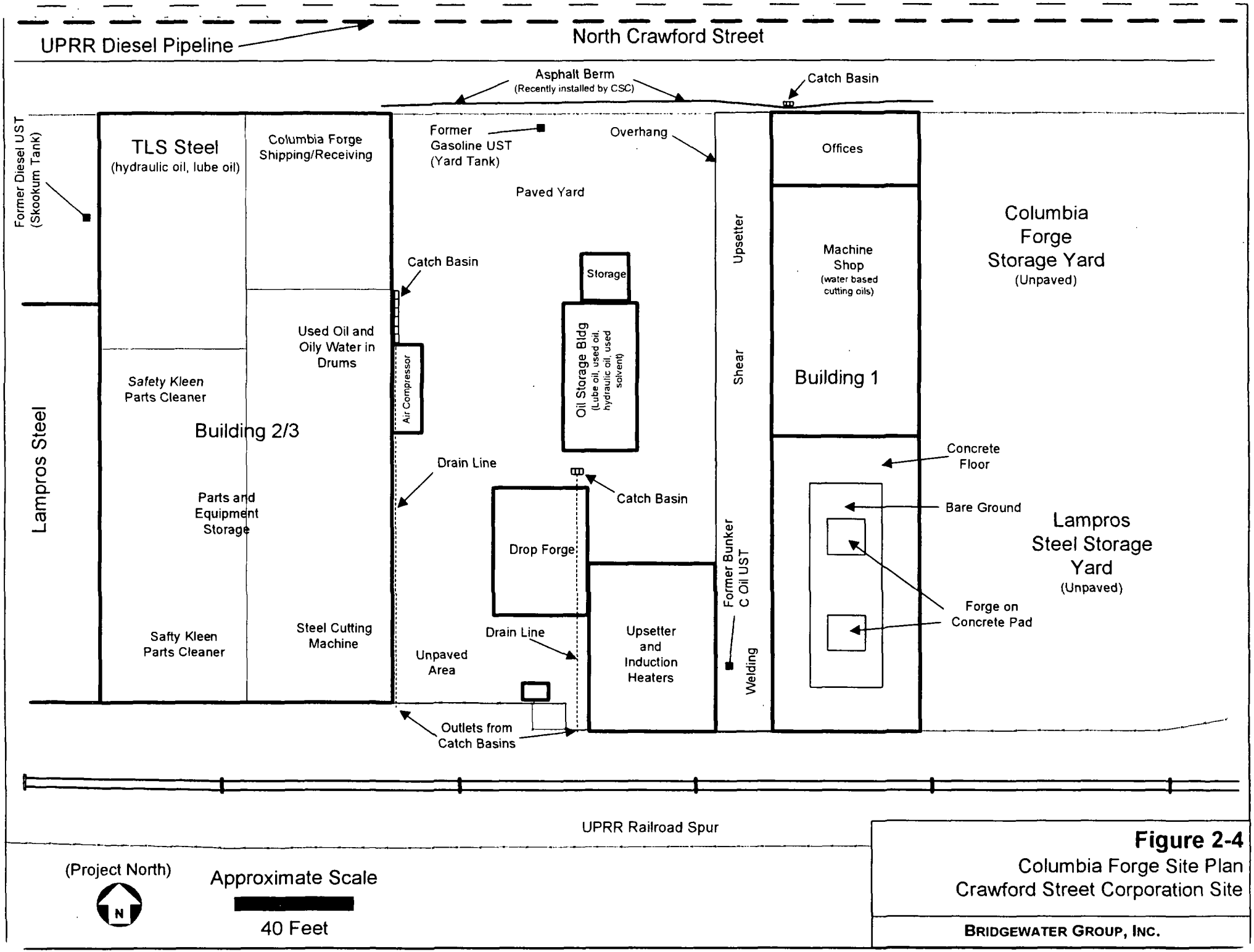


Figure 2-4
Columbia Forge Site Plan
Crawford Street Corporation Site

BRIDGEWATER GROUP, INC.

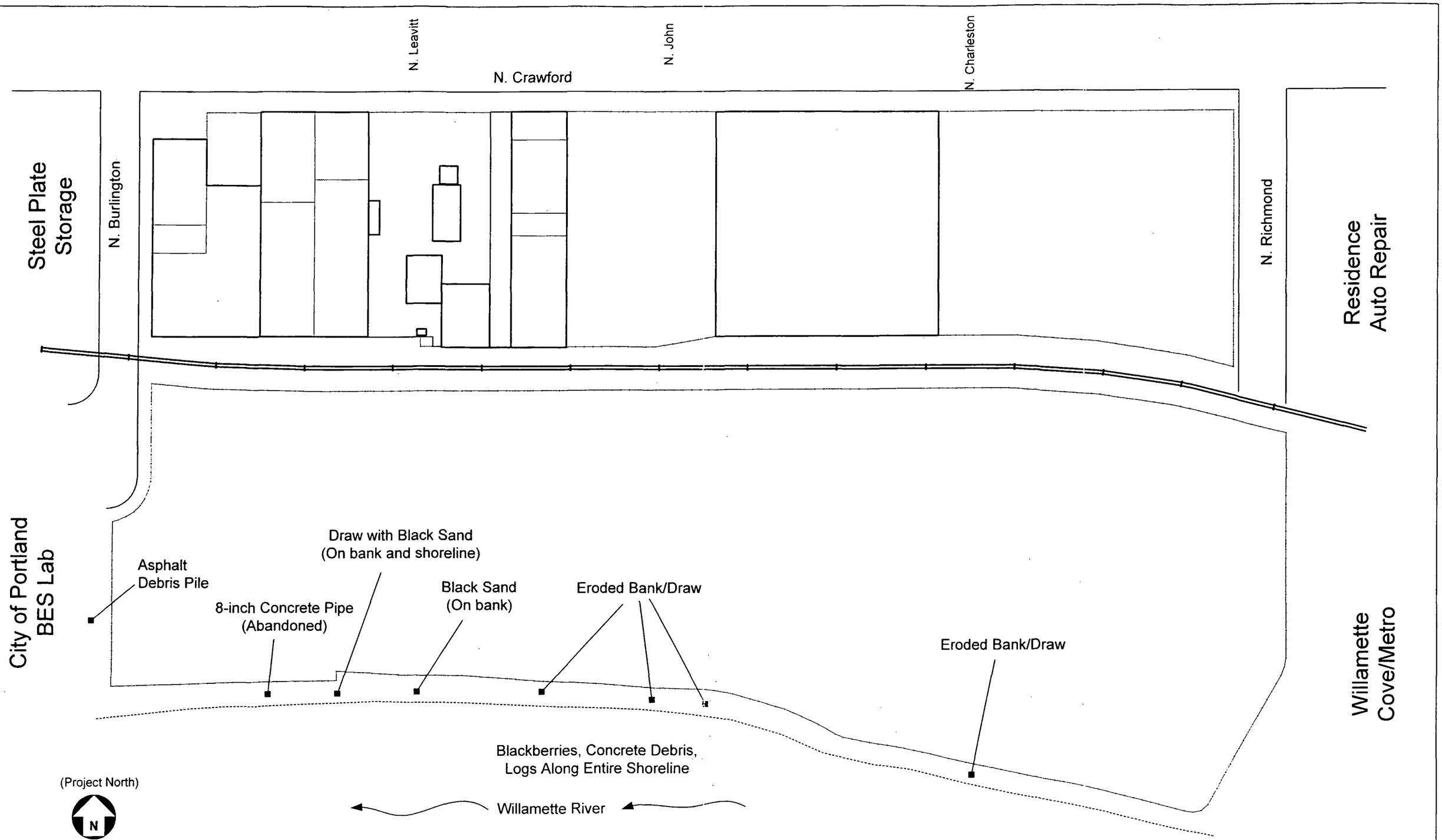


Figure 2-5
Shoreline Features
Crawford Street Corporation

BRIDGEWATER GROUP, INC.

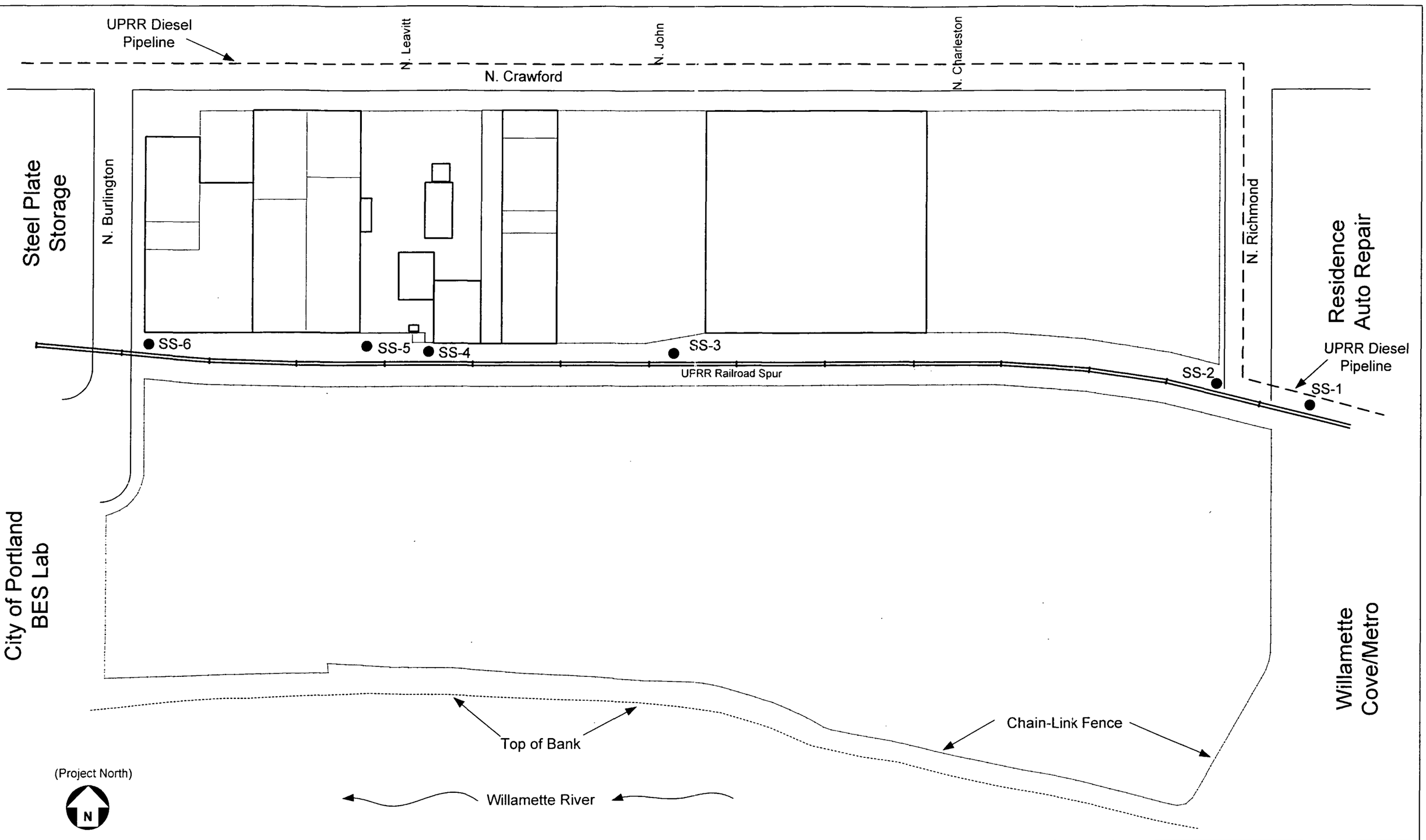


Figure 5-1
Proposed PA Surface Soil Sampling Locations
Crawford Street Corporation Site
BRIDGEWATER GROUP, INC.

APPENDIX A

PHOTOGRAPHS OF CURRENT SITE CONDITIONS

Photo No. 1

Photo Date: 12/9/99

Looking southeast from intersection of North Burlington and North Crawford Streets.

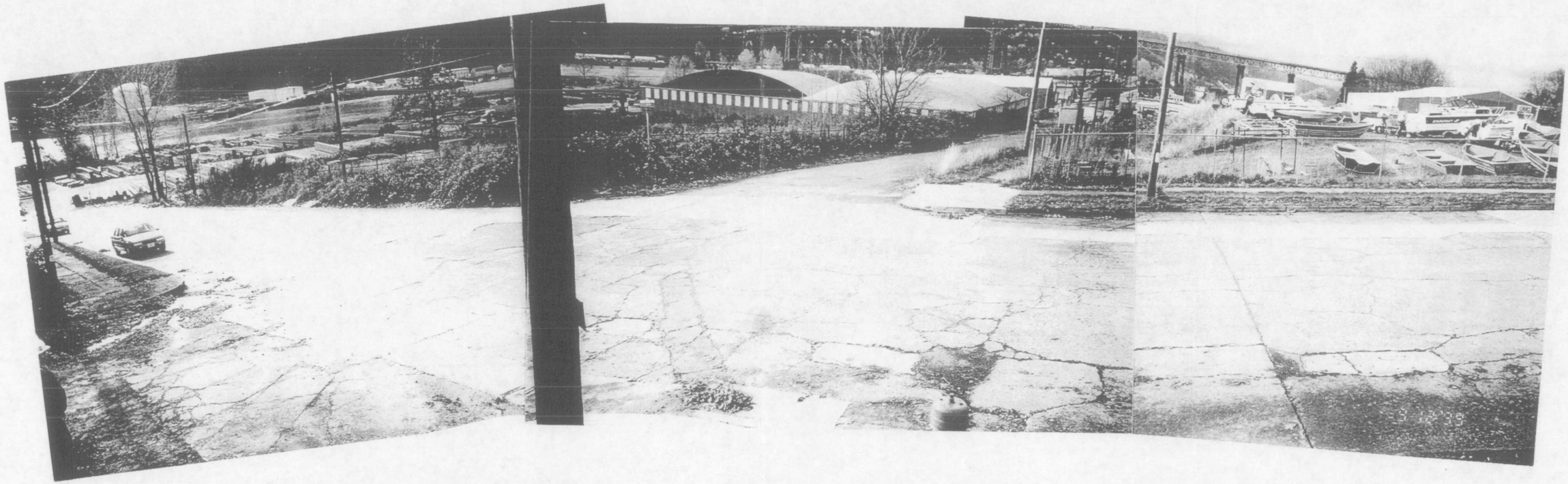


Photo No. 2 **Photo Date: 12/9/99**

Looking southwest from intersection of North Richmond and North Crawford Streets.

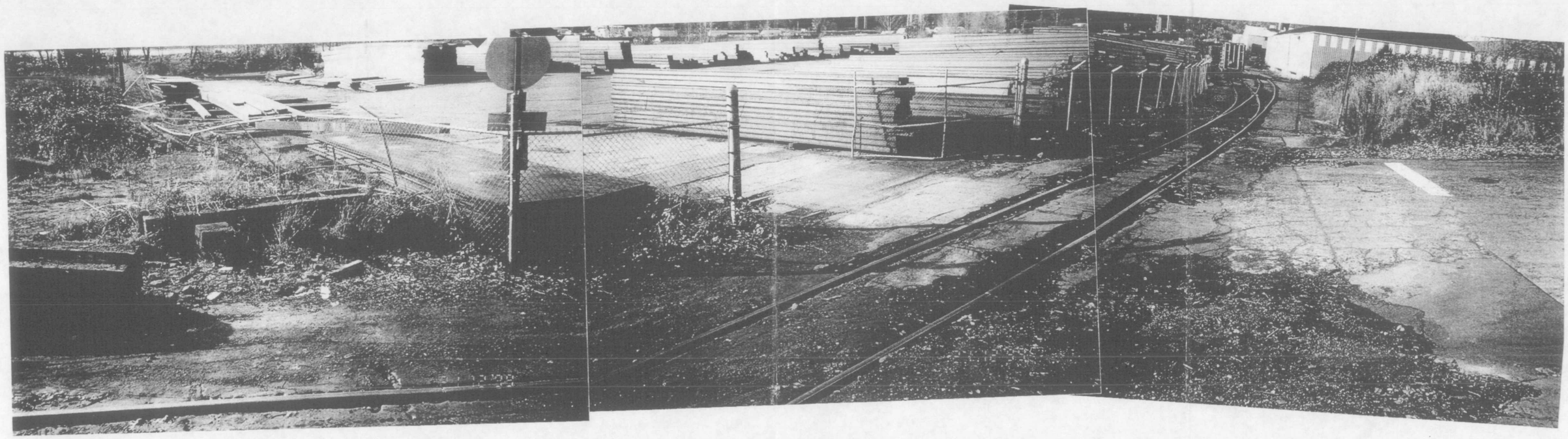


Photo No. 3 **Photo Date: 4/28/99**

Looking southwest into South Area (Lampros Steel storage yard) from intersection of UPRR rail spur and North Richmond Street.

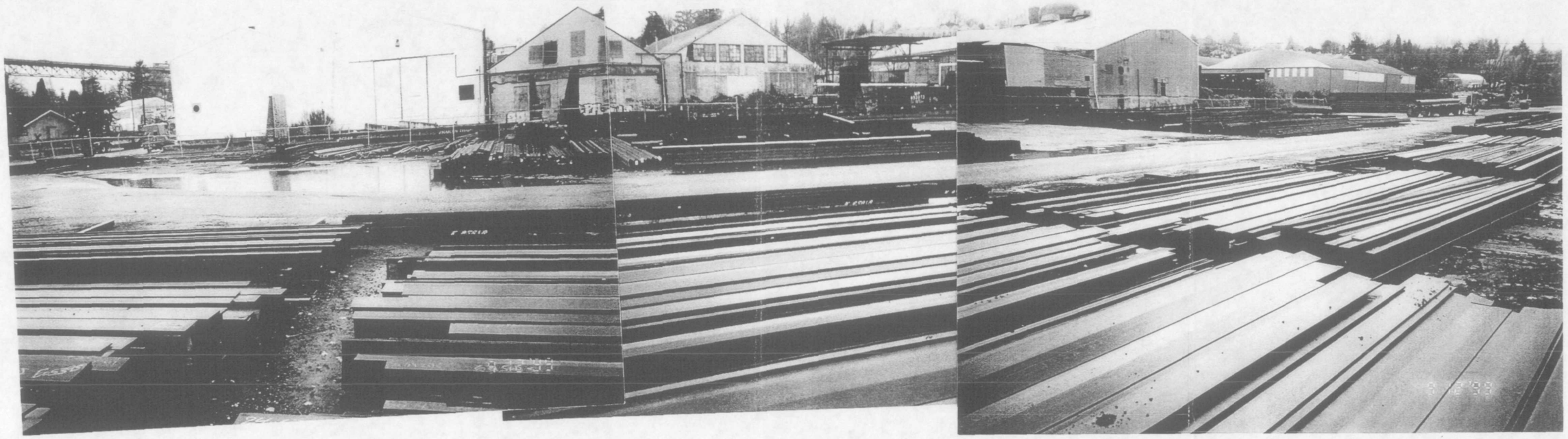


Photo No. 4 **Photo Date: 12/9/99**

Looking north across South Area (Lampros Steel storage yard) at south side of Columbia Forge and Lampros Steel.

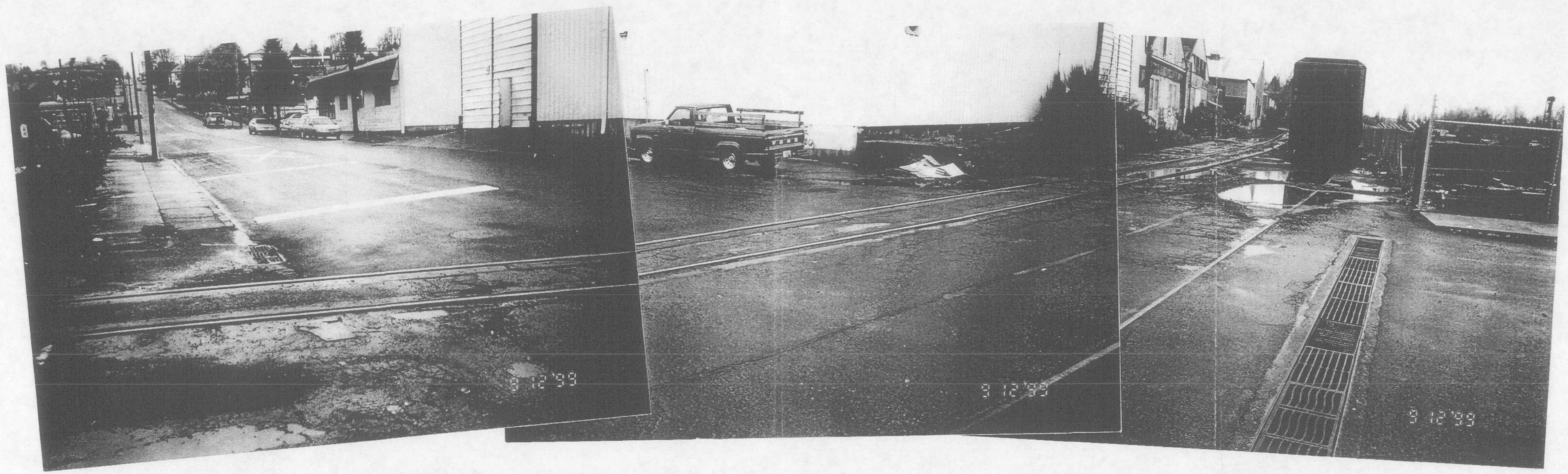


Photo No. 5

Photo Date: 12/9/99

Looking northeast from intersection of North Burlington Street and UPRR rail spur.

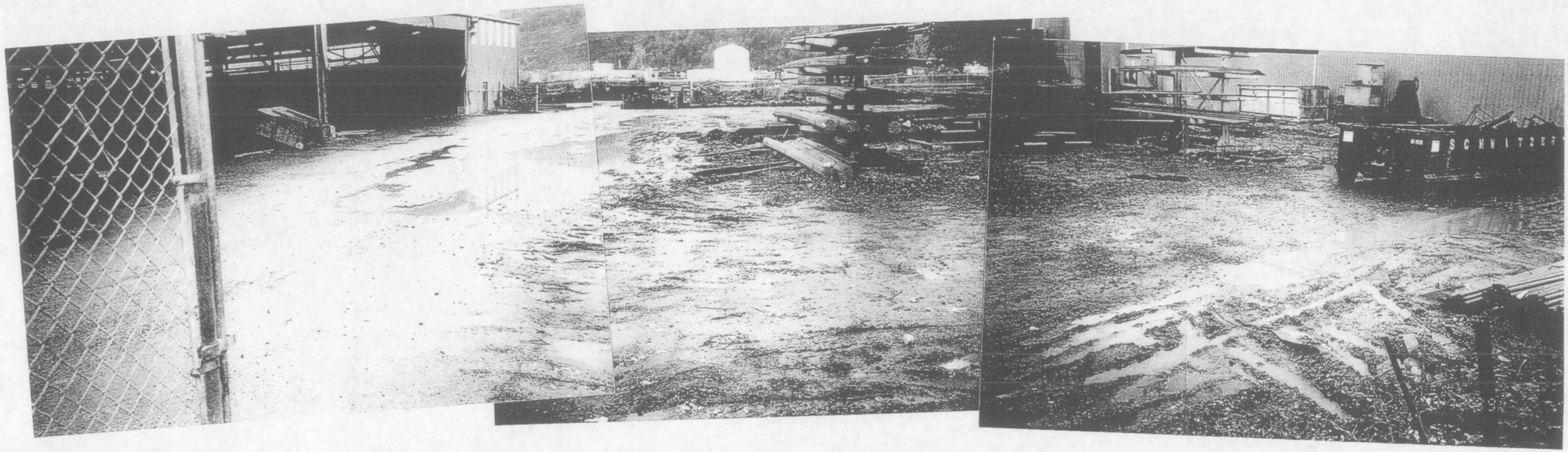


Photo No. 6

Photo Date: 12/9/99

Looking south across Columbia Forge/Lampros Steel yard.

Photo No. 7

Photo Date: 12/9/99

Columbia Forge Yard. Looking northwest.

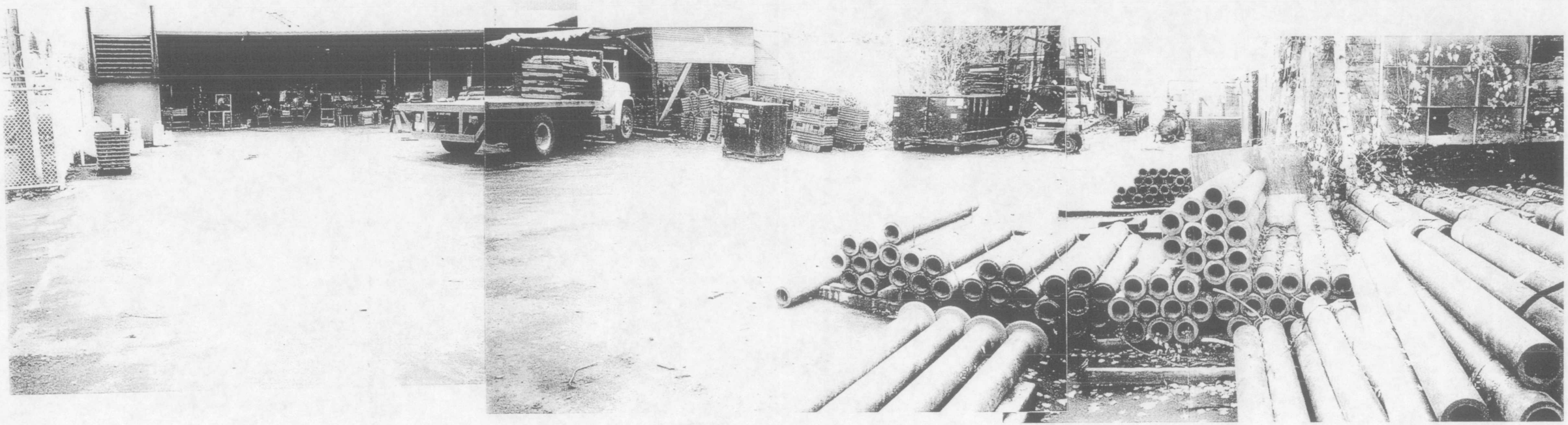


Photo No. 8

Photo Date: 12/9/99

Columbia Forge Yard. Looking southeast.

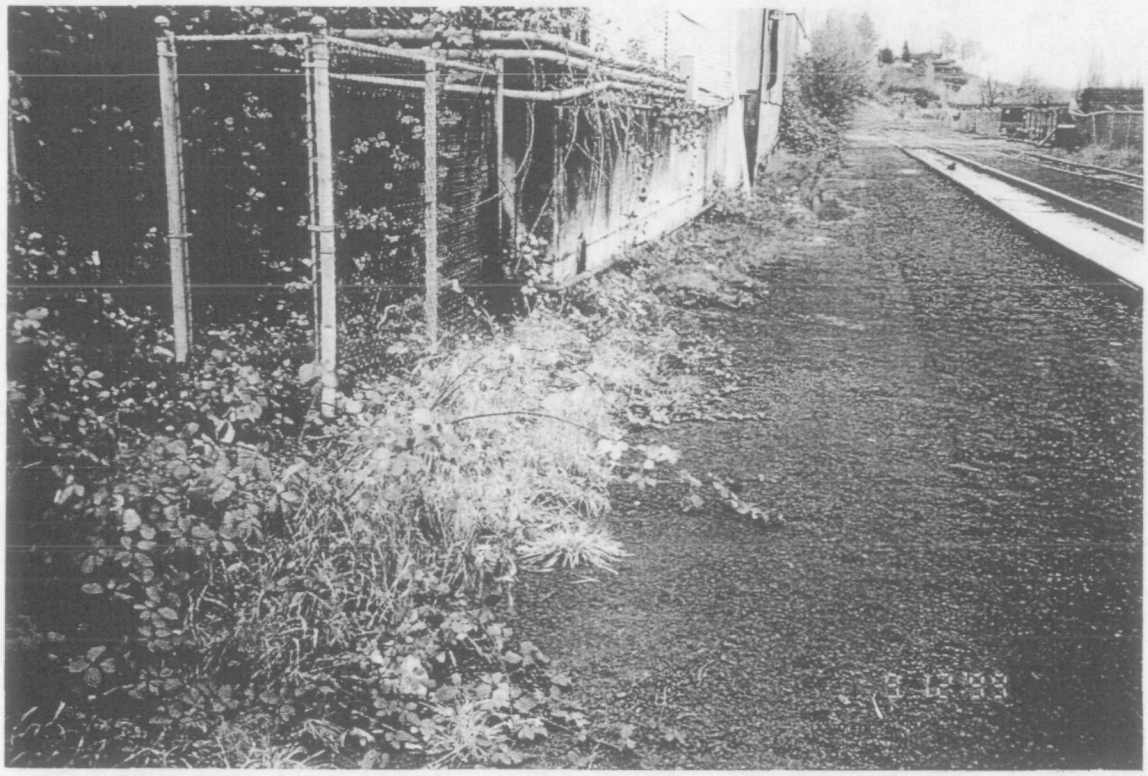


Photo No. 16 **Photo Date: 12/9/99**

Looking east along UPRR rail spur from south side of Columbia Forge yard.

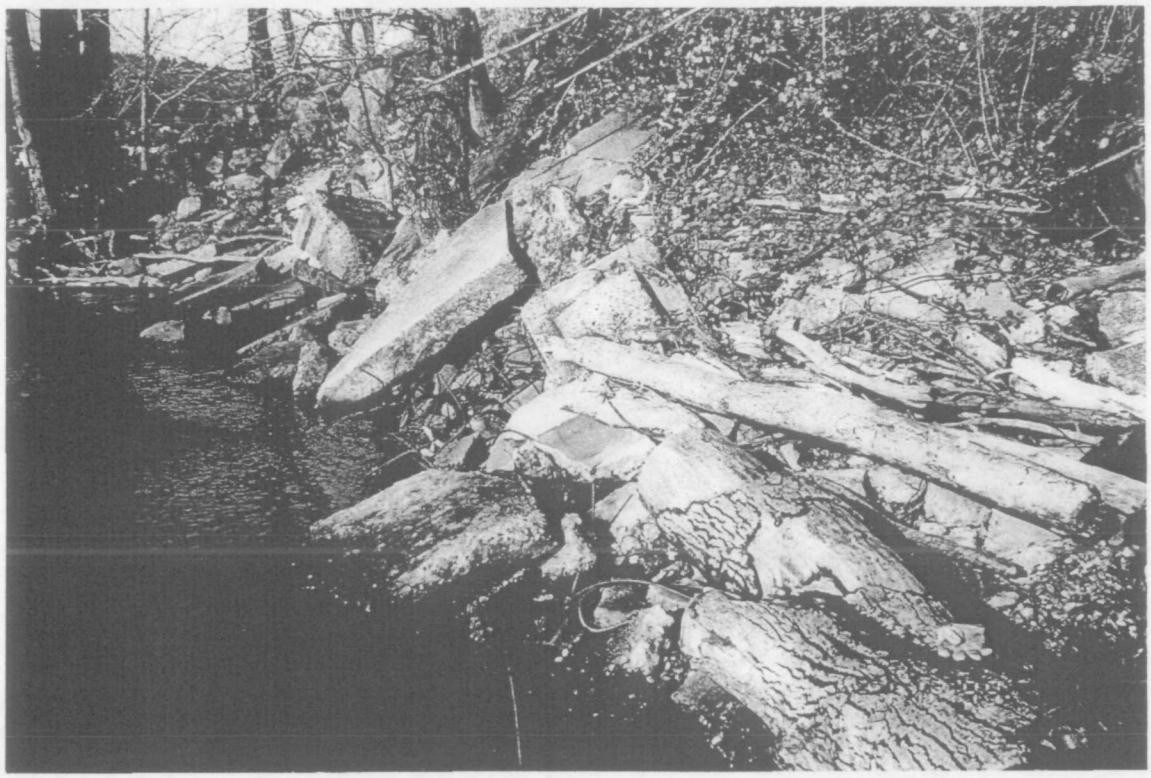


Photo No: 17 **Photo Date: 12/21/99**

Typical river bank conditions.

Photo No. 18 **Photo Date: 12/21/99**

Looking north from north side of Columbia Forge/Lampros Steel yard at St. Johns Truck and Equipment debris yard. Storm water runs from this area, across Crawford Street, and on to and across the storage yard.

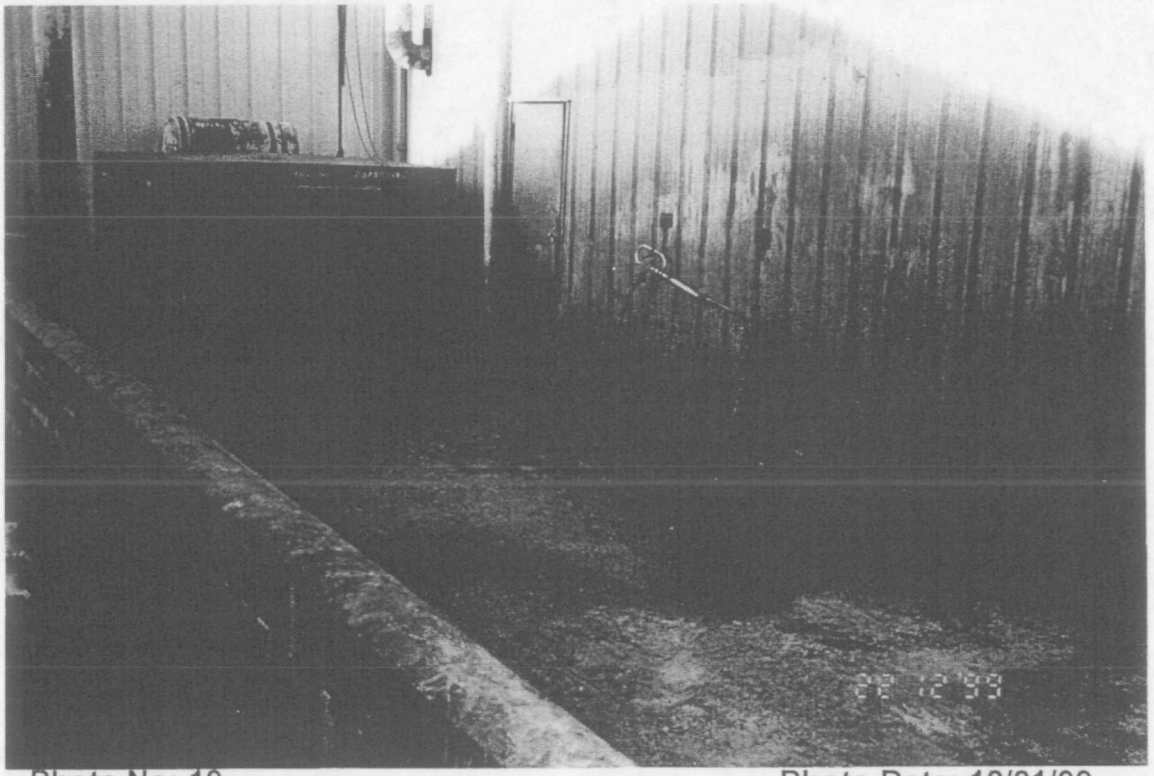


Photo No: 19 **Photo Date: 12/21/99**

Stained wash area adjacent to Crawford Street at St. Johns Truck and Equipment. Across Crawford Street from Columbia Forge.

Photo No. 20 **Photo Date: 12/21/99**

Looking north at St. Johns Truck and Equipment truck storage yard. Storm water runs from this area, across Crawford Street, and on to and across the Lampros and TLS Steel areas.

Photo No: 21 **Photo Date: 12/21/99**

Looking south down North Richmond Street. Storm water flows down this street to UPRR rail spur area and to the Lampros Steel south storage yard.

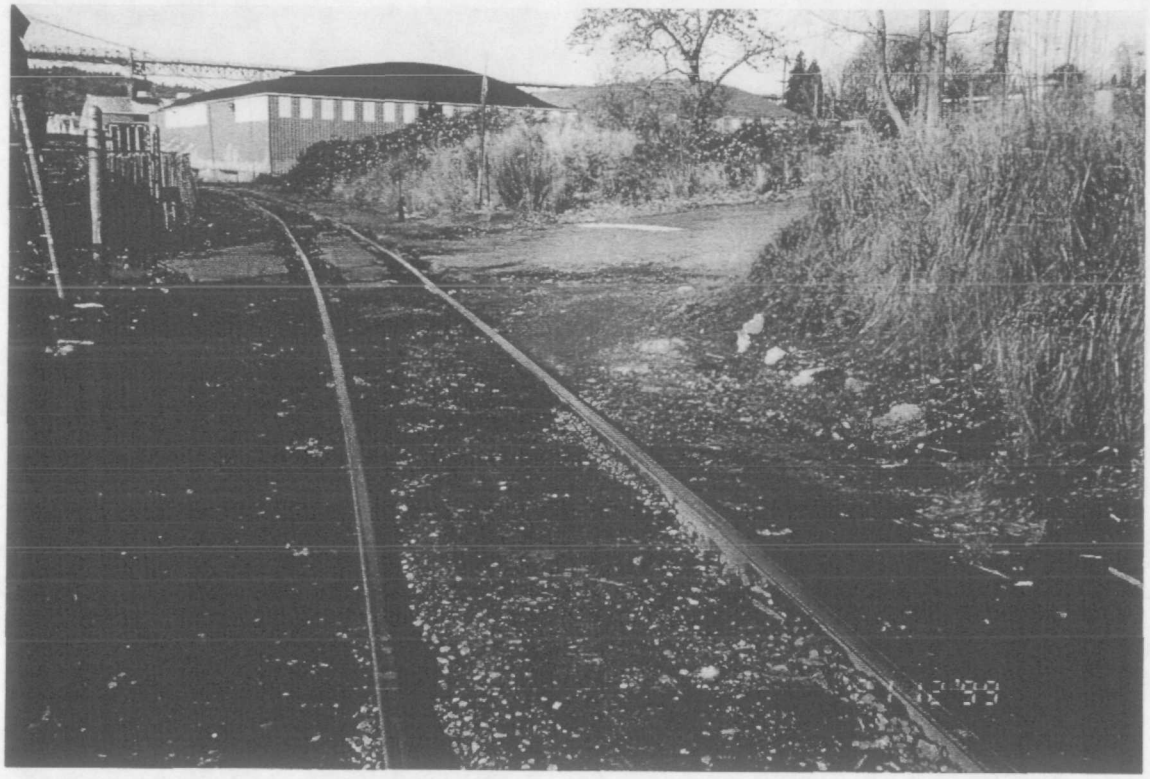


Photo No. 22 **Photo Date: 12/21/99**

Looking west from east of site along UPRR rail spur. Note fresh oil stain in rail alignment east of Crawford Street. Stain drips continue onto the Crawford Street site.

Photo No: 23 **Photo Date: 12/9/99**

Looking northeast from City of Portland property west of Crawford Street site. Note asphalt and concrete debris pile on City property.

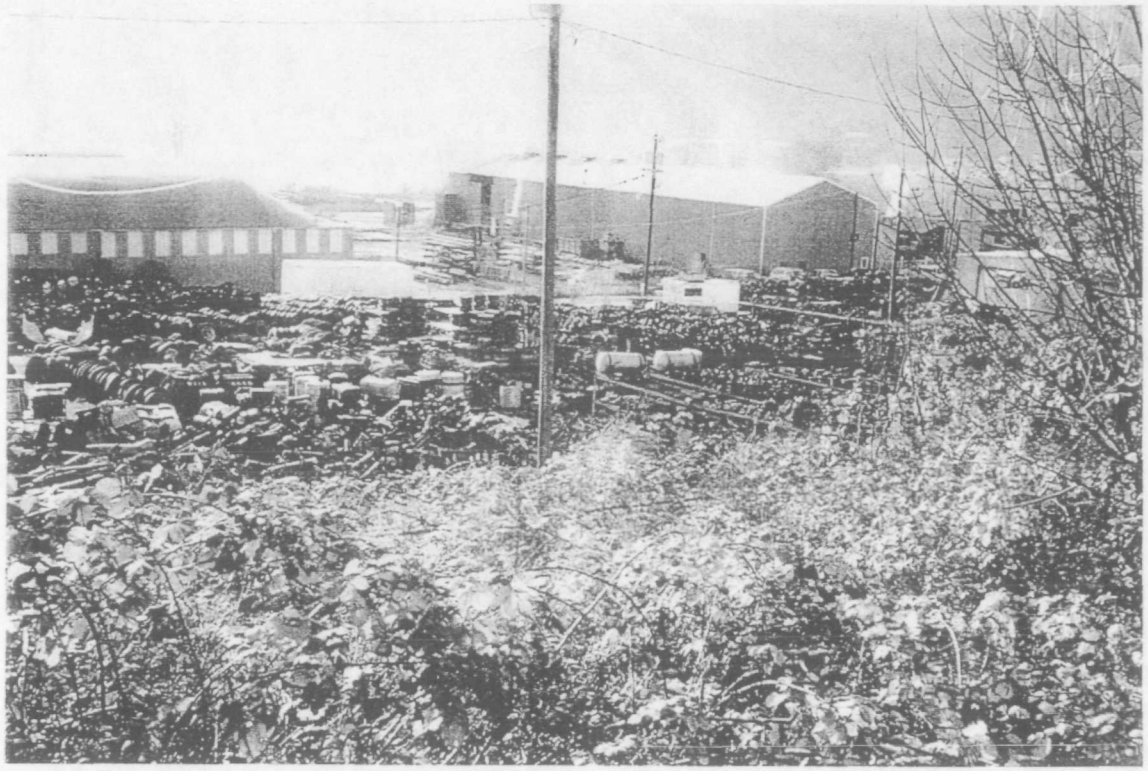


Photo No. 24 **Photo Date: 12/21/99**

Looking south from hill above site. St. Johns Truck and Equipment debris yard north (up gradient) of Crawford Street site.

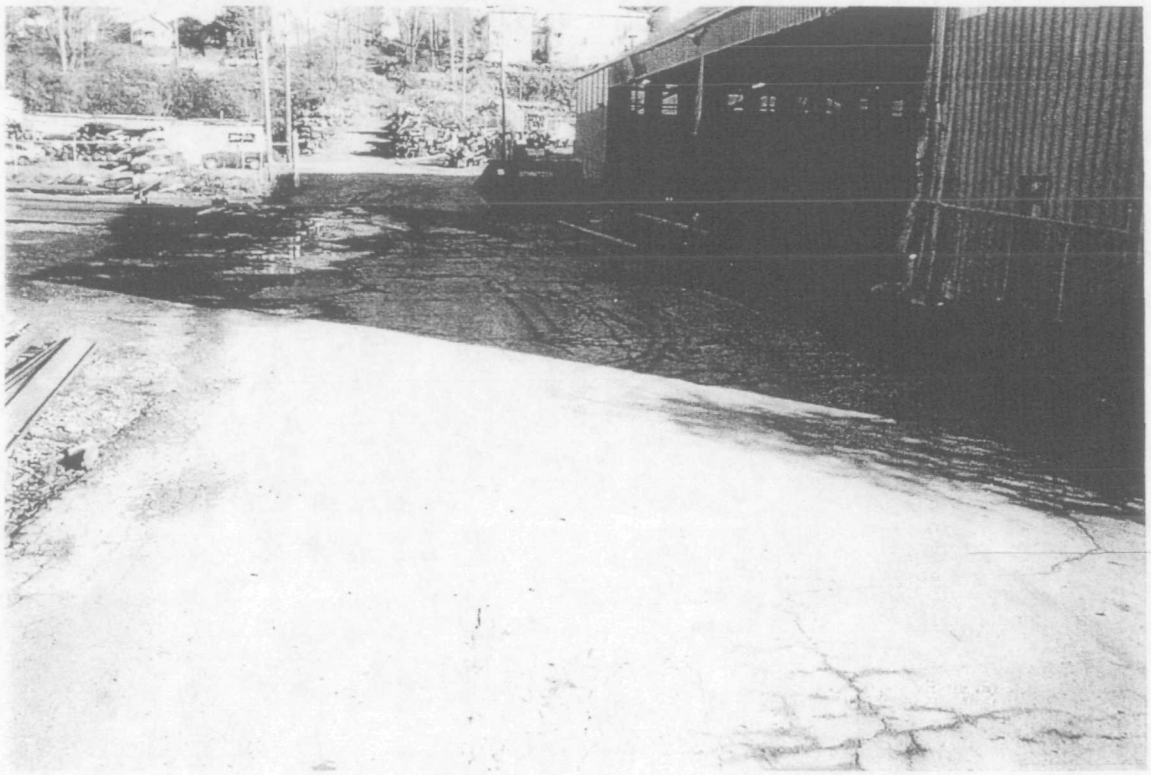


Photo No: 25 **Photo Date: 12/21/99**

Looking north from south end of Columbia Forge/Lampros Steel yard at UPRR rail spur. St. Johns Truck and Equipment debris yard in distance. Lampros Steel beam cutting building on right.

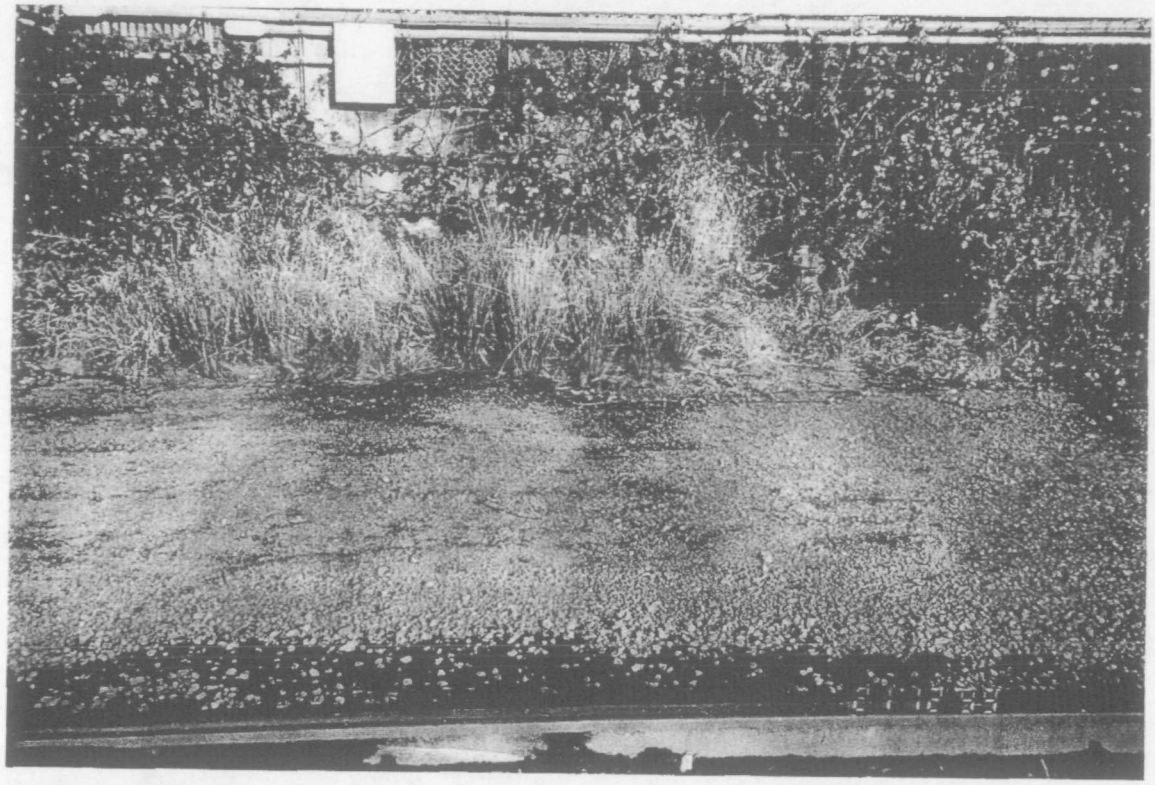


Photo No. 14 **Photo Date: 12/21/99**

Looking north at drain line outlet from west end of Columbia Forge yard.

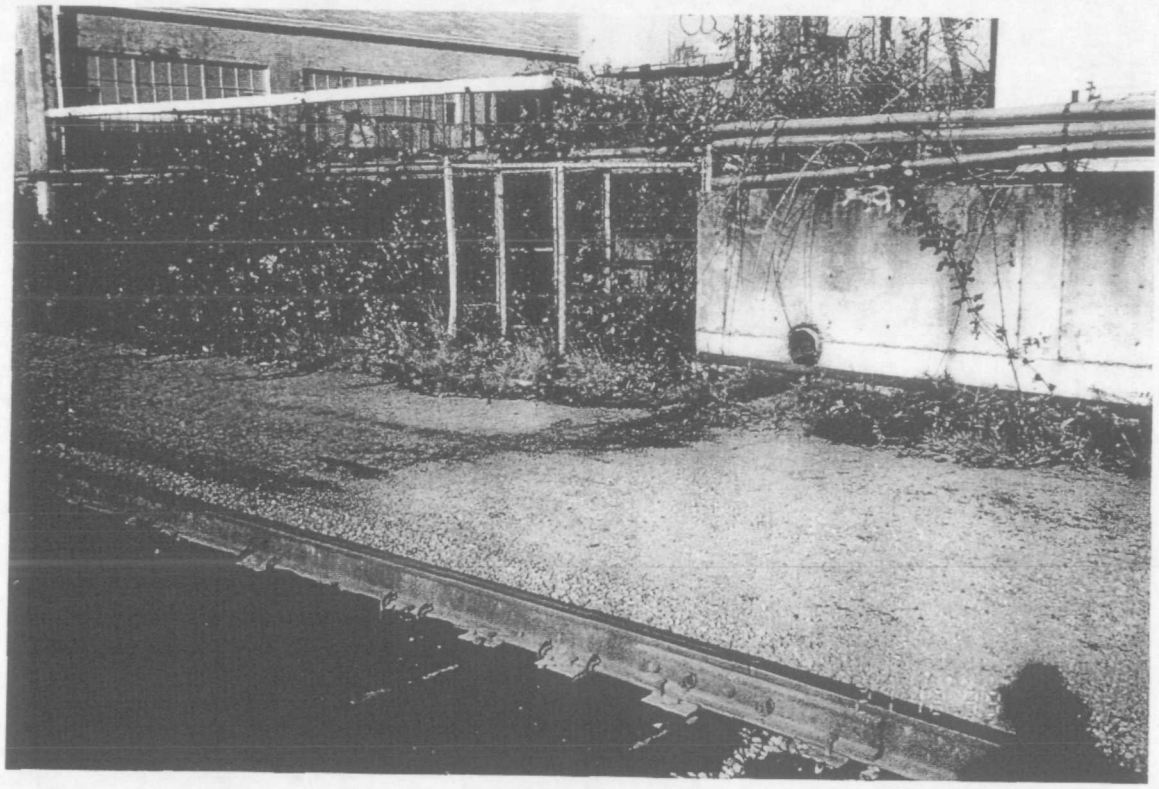


Photo No: 15 **Photo Date: 12/21/99**

Looking north at drain line outlet from east end of Columbia Forge yard.

Photo No. 13

Photo Date: 12/9/99

Inside Lampros Steel building at west end of site.

Photo No. 9 **Photo Date: 12/9/99**

Southwest area of Columbia Forge Building 1. Looking south.

Photo No: 10 **Photo Date: 12/9/99**

Machine Shop in north portion of Columbia Forge Building 1.

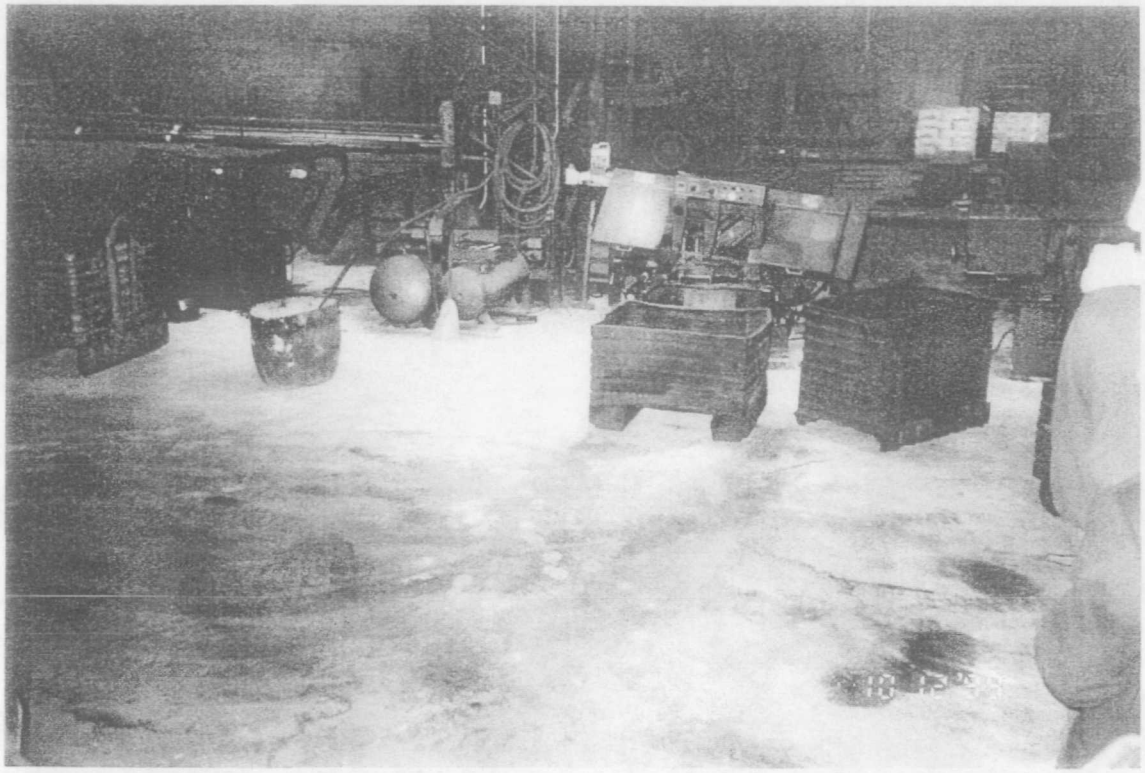


Photo No. 11 **Photo Date: 12/9/99**

Inside Lampros Steel

Photo No: 12 **Photo Date: 12/9/99**

Inside Lampros Steel building at west end of site.

APPENDIX B

ANALYTICAL LABORATORY REPORT FOR UNDERGROUND STORAGE TANK REMOVAL SOIL SAMPLES

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

March 19, 1987
Log #A870316-B1-2
PO#: 2842

Columbia Forge & Machine
8424 N. Crawford St.
Portland, Oregon 97203

Attention: John Shore

Sample ID: #1 - Skookum, 3/13/87
#2 - Yard, 3/13/87

Samples Received: March 13, 1987

Samples Collected by: Crosby & Overton

ANALYSIS	SAMPLE #1	SAMPLE #2
Gasoline*	< 1.0	16**
Diesel*	< 1.0	< 1.0
Lead	---	30.0

Results in mg/kg

* Analysis by extraction capillary GC/FID.

** Appears to contain some other high boiling oil and possibly some kerosene.

The less than "<" symbol means none detected at or above the indicated value and represents the detection limit for the method.

Approved by,

Susan M. Brillante

Susan M. Brillante,
Laboratory Director

Sincerely,

Susan M. Coffey

Susan M. Coffey,
President

Soil grab
Yard

SMC/gs

This report is for the sole and exclusive use of the above client. (no
Samples are retained a maximum of 15 days from the date of this letter.

B 11587

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

March 24, 1987
Log #A870316-B1-2

Columbia Forge & Machine
8424 N. Crawford St.
Portland, Oregon 97203

ATTENTION: John Shore

SUBJECT: EP TOXICITY ANALYSIS

METHOD: Federal Register, Vol. 45 No. 98, Monday, May 19, 1980, Rules and Regulations, Appendix II, Page 33127.

FIELD DATA: Sample ID: #2 - Yard
Collected by: Sample collected and delivered by client.

Sample Received: March 16, 1987

ANALYSIS	RESULTS	LIMIT
Lead	< 0.100	5.0

The less than "<" symbol means none detected at or above the indicated value and represents the detection limit for the method.

Results are reported in milligrams per liter (mg/L)

Sincerely,

Susan M. Coffey

Susan M. Coffey,
President

SMC/gs

ordered with for YC
2nd soil ok
We only dare

This report is for the sole and exclusive use of the above client. Samples are retained a maximum of 15 days from the date of this letter.

B 11588

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

March 24, 1987
Log #A870319-K
PO#: 2864

Columbia Forge & Machine
8424 N. Crawford St.
Portland, Oregon 97203

Attention: John Shore

Analysis Requested: Total Hydrocarbons

Sample ID: #3 Weld Shop

Sample Date: March 19, 1987

Sample Received: March 19, 1987

ANALYSIS	RESULTS
Gasoline	< 4 mg/kg
Diesel	< 4 mg/kg

Analysis by capillary GC/FID

The less than "<" symbol means none detected at or above the indicated value and represents the detection limit for the method.

Approved,

Susan M. Brillante

Susan M. Brillante,
Laboratory Director

Sincerely,

Susan M. Coffey

Susan M. Coffey,
President

SMC/gs

Soil analysis
weld st
(no ri

This report is for the sole and exclusive use of the above client. Samples are retained a maximum of 15 days from the date of this letter.

B 11592